FEDERAL REGISTER

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TITLE 16—COMMERCIAL PRACTICES

Chapter I—Federal Trade Commission

[Docket 5832]

PART 3—DIGEST OF CEASE AND DESIST ORDERS

HAUPTMAN FEATHER CO., INC., ET AL.

Subpart—*Misbranding or mislabeling:* § 3.1185 *Composition.* In connection with the offering for sale, sale and distribution of pillows in commerce, misrepresenting in any manner or by any means, directly or by implication, the materials of which respondents' pillows are made; prohibited.

(Sec. 6, 38 Stat. 722; 15 U. S. C. 46. Interprets or applies sec. 5, 38 Stat. 719, as amended; 15 U. S. C. 45) [Cease and desist order, Hauptman Feather Company, Docket 5832, August 17, 1951]

In the Matter of Hauptman Feather Co., Inc., a Corporation, and Mitchell Hauptman, Abraham Hauptman, and Jean Rabinowitz, Individually and as Officers of Said Corporation

This proceeding was heard by William L. Pack, trial examiner, upon the complaint of the Commission, respondents' answer, and a stipulation whereby it was stipulated and agreed that a statement of facts executed by counsel supporting the complaint and counsel for respondents might be taken as the facts in this proceeding and in lieu of evidence in support of and in opposition to the charges stated in the complaint, and that such statement of facts might serve as the basis for findings as to the facts and conclusion based thereon and an order disposing of the proceeding. The right to file proposed findings and conclusions and to argue the matter orally before the trial examiner, reserved by counsel for respondents in the stipulation, was subsequently waived, and it was further provided therein that upon appeal to or review by the Commission such stipulation might be set aside by it and the matter remanded for further proceedings under the complaint.

Thereafter the proceeding regularly came on for final consideration by the trial examiner upon the complaint, answer and stipulation, which was approved by said trial examiner, and said trial examiner, after duly considering the record in the matter, and having found that the proceeding was in the interest of the public, made his initial decision comprising certain findings as to the facts, conclusion drawn therefrom and order to cease and desist.

No appeal having been filed from said initial decision of said trial examiner as provided for in Rule XXII, nor any other action taken as thereby provided to prevent said initial decision becoming the decision of the Commission thirty days from service thereof upon the parties, said initial decision, including said order to cease and desist, accordingly, under the provisions of said Rule XXII became the decision of the Commission on August 17, 1951.

The said order to cease and desist is as follows:

It is ordered, That the respondents, Hauptman Feather Company, Inc., a corporation, and its officers, and Mitchell Hauptman, Abraham Hauptman and Jean Rabinowitz, individually and as officers of said corporation, and respondents' representatives, agents and employees, directly or through any corporate or other device, in connection with the offering for sale, sale and distribution of pillows in commerce, as "commerce" is defined in the Federal Trade Commission Act, do forthwith cease and desist from: Misrepresenting in any manner or by any means, directly or by implication, the materials of which respondents' pillows are made.

By "Decision of the Commission and order to file report of compliance", Docket 5832, August 17, 1951, which announced and decreed fruition of said initial decision, report of compliance with the said order was required as follows:

It is ordered, That the respondents herein shall, within sixty (60) days after service upon them of this order, file with the Commission a report in writing setting forth in detail the manner and form

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in which they have complied with the order to cease and desist.

Issued: August 17, 1951.

By the Commission.

[SEAL] D. C. DANIEL, *Secretary.*

[F. R. Doc. 51-12263; Filed, Oct 11, 1951; 8:47 a. m.]

TITLE 14—CIVIL AVIATION

Chapter II—Civil Aeronautics Administration, Department of Commerce

PART 514—TECHNICAL STANDARD ORDERS—C SERIES—AIRCRAFT COMPONENTS

EDITORIAL NOTE: Set forth below is a complete publication of the text of Part 514 which was promulgated in F. R. Doc. 51-881, 16 F. R. 675.

Sec.

514.1 Technical Standard Order C1a: "Smoke Detectors".
514.2 Technical Standard Order C2a: "Airspeed Indicator (Pitot Static)".
514.3 Technical Standard Order C3a: "Turn-and-Bank Indicator".
514.4 Technical Standard Order C4b: "Bank-and-Pitch Indicator (Stabilized Type) (Gyro Horizon, Attitude Gyro)".
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514.21 Technical Standard Order C21: "Special Aircraft Turnbuckle Assemblies and/or Turnbuckle Safetying Devices".
514.22 Technical Standard Order C22a: "Safety Belts".
514.23 Technical Standard Order C23: "Parachutes".
514.24 Technical Standard Order C24: "Landing Flares".
514.25 Technical Standard Order C25: "Aircraft Seats and Berths".

AUTHORITY: §§ 514.1 to 514.25 issued under sec. 205, 54 Stat. 984, as amended; 49 U. S. C. 425. Interpret or apply sec. 601, 52 Stat. 1007, as amended; 49 U. S. C. 551.

§ 514.1 *Technical Standard Order C1a: "Smoke Detectors"*—(a) *Introduction.* (1) Smoke detectors are in the class of aircraft components which the Administrator of Civil Aeronautics is authorized to approve in accordance with Parts 4a and 4b of this title.

(2) This Technical Standard Order is intended to serve as a criterion by which the product manufacturer can obtain Civil Aeronautics Administration approval of his smoke detector.

(3) In the establishment of this Technical Standard Order, consideration has been given to existing Government and industry standards for smoke detectors for the purpose of adopting the performance requirements of one of the recognized aeronautical standards as the minimum safety requirements for smoke detectors which are intended for use in civil aircraft. The specification of the Society of Automotive Engineers for smoke detectors contains such requirements.

(b) *Directive*—(1) *Provision.* Pursuant to Parts 4a and 4b of this title, which authorize the Administrator to approve aircraft equipment, the performance requirements for smoke detectors as set forth in SAE Specification AS–400, Smoke Detectors, dated July 1, 1947,[1] stated below, with the exceptions hereinafter noted, are established as the minimum safety requirements for smoke detectors which are intended for use in civil aircraft:

1. *Purpose.* To specify minimum requirements for smoke detection instruments for use in aircraft, the operation of which may subject the instrument to environmental conditions specified in section 3.4.

2. *Scope.* This specification covers two basic types as follows:

Type I. Carbon monoxide.
Type II. Photoelectric cell.

3. *General requirements.*

3.1. *Material and workmanship.*

3.1.1. *Material.* Materials shall be of a quality which experience or tests have demonstrated to be suitable and dependable for use in aircraft instruments.

3.1.2. *Workmanship.* Workmanship shall be consistent with high-grade aircraft instrument manufacturing practice.

3.2. *Radio interference.* The instrument shall not be the source of objectionable interference, under operating conditions at any frequencies used on aircraft, either by radiation or feed-back, in radio sets installed in the same aircraft as the instrument.

3.3. *Identification.* The following information shall be legibly and permanently marked on the instrument or attached thereto:

(a) Name of instrument (smoke detector).
(b) SAE Spec. AS–400.
(c) Rating (electrical, vacuum, etc.).
(d) Manufacturer's part number.
(e) Manufacturer's serial number or date of manufacture.
(f) Manufacturer's name and/or trademark.

3.4. *Environmental conditions.* The following conditions have been established as design criteria only. Tests shall be conducted as specified in sections 5, 6, and 7.

3.4.1. *Temperature.* When mounted in accordance with the instrument manufacturer's instructions, the instrument shall function over the range of ambient temperature of −55° C. to 60° C. and shall not be adversely affected by exposure to temperatures in the range −65° C. and to 70° C.

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West Thirty-ninth Street, New York, N. Y.

3.4.2. *Humidity.* The instrument shall function and not be adversely affected when exposed to a relative humidity of up to and including 95% at a temperature of approximately 32° C.

3.4.3. *Altitude.* The instrument shall function and not be adversely affected when subjected to a pressure and temperature range equivalent to −1,000 feet to +40,000 feet standard altitude.

3.4.4. *Vibration.* When mounted in accordance with the instrument manufacturer's instructions, the units shall function and shall not be adversely affected when subjected to the following vibrations:

Type of instrument mounting	Cycles per minute [1]	Amplitude [1]	Max. acceleration
		Inch	
Shock mounted panel instruments	500–3000	0.005	0.8 g
Unshock mounted panel instruments	500–3000	.010	1.3 g
Airframe structure mounted instruments	500–3000	.030	3.8 g

[1] It is understood that the unit shall withstand vibrations at higher frequencies, but the acceleration values need not exceed those shown above.

When specified by the purchaser for use in rotary wing aircraft, the frequency range shall be 150–3000 cycles per minute.

4. *Detail requirements.*

4.1. *Design.*

4.1.1. The instrument shall consist of a means for:

Type I: Testing air for contamination with gaseous products of combustion. It shall include an alarm circuit or control circuit which will indicate the presence of contamination when it reaches a concentration of not more than 0.010% of carbon monoxide by volume.

Type II: Testing air for contamination with smoke or gas of all colors or particle sizes. It shall include an alarm circuit or control circuit which will indicate the presence of contamination which reduces the light transmission to not less than 90% of that of clean air. Percentage of transmission is defined as the light falling on a photoelectric cell through a one foot distance as compared to the light transmitted in clear air.

4.1.2. A means shall be incorporated in the design to admit the air sample to the sensitive element of the instrument in a positive manner.

4.2. *Indicating method.* The instrument shall be capable of actuating both visual and aural alarm indicators.

4.3. *Reliability.* False signals in the instrument shall not result from variations in voltage (+25% and −100% of the rated), flight altitude, accelerations encountered in flight or landing, and from normal amounts of dust they may accumulate within the instrument under normal flight operation.

4.4. *Integrity test provision.* The instrument shall be provided with a means for being tested in flight. The test shall cause operation of the alarm circuit or control circuit by initiating the sequency of actions through a disturbance in the instrument.

4.5. *Sampling characteristics.* When an instrument installation is designed to divert the air samples from more than one sampling station, it shall cycle at a rate not to exceed 30 seconds per sampling station, in which case, flow of air through all the sampling conduits shall be maintained continuously. In addition, when a smoke alarm is indicated, an alarm shall be actuated to indicate the location in which the smoke or gas is being generated and to continue to indicate the alarm until the condition is eliminated. It shall begin cycling in a normal manner

within 30 seconds after releasing the alarm signal.

5. *Test conditions.*

5.1. *Atmospheric conditions.* Unless otherwise specified, all tests required by this specification shall be made at an atmospheric pressure of approximately 29.92 inches of mercury and at an ambient temperature of 22° C. When tests are made with the atmospheric pressure or the temperature substantially different from these values, allowance shall be made for the variations from the specified conditions.

5.2. *Vibration (to minimize friction).* Unless otherwise specified, all tests for performance may be made with the instrument subjected to a vibration of 0.002 to 0.005 inch amplitude at a frequency of 1,500 to 2,000 cycles per minute. The term amplitude as used herein indicates the total displacement from positive maximum to negative maximum.

5.3. *Vibration stand.* A vibration stand shall be used which will vibrate at any desired frequency between 500 and 3,000 cycles per minute and shall subject the instrument to vibration such that a point on the instrument will describe, in a plane inclined 45 degrees to the horizontal plane, a circle, the diameter of which is equal to the amplitude specified herein.

5.4. *Test position.* Unless otherwise specified, the instrument shall be mounted and tested in its normal operation position.

5.5. *Air sample.* Unless otherwise specified, air samples shall be as follows:

(1) Air containing 0.01% plus or minus 0.005% carbon monoxide, or

(2) Air containing smoke or gas having a light transmission value of 85% to 92% of that of clear air.

5.6. *Power conditions.* Unless otherwise specified all tests for performance shall be conducted at the power rating recommended by the manufacturer.

6. *Individual performance requirements.* All instruments, or components of such, shall be subjected to whatever tests the manufacturer deems necessary to demonstrate specific compliance with this specification including the following requirements where applicable.

6.1 *Response time.* The instrument shall be tested, so that, when an air sample per section 5.5 is introduced into the instrument under normal room temperature and atmospheric pressure conditions the alarm circuit or control circuit shall be energized within a maximum of 30 seconds.

6.2. *Dielectric.* The insulation shall be subjected to a dielectric test with an R. M. S. voltage at a commercial frequency applied for a period of 5 seconds equivalent to 5 times normal circuit operating voltage, except where circuits include components for which such a test would not be appropriate the test voltage shall be 1.25 times the normal circuit operating voltage. The insulation response shall not be less than 20 megohms at that voltage.

7. *Qualification tests.* As many instruments as deemed necessary to demonstrate that all instruments will comply with the requirements of this section shall be tested in accordance with the manufacturer's recommendations. The tests of each instrument shall be conducted consecutively and after the tests have been initiated, no further adjustments of the instrument shall be permitted. For those instruments which employ a cycling device for testing a multiplicity of locations with one instrument, these tests shall be conducted on the basis of a single sample station. During these tests no false alarm shall result.

7.1. *Stability.* The instrument shall be operated continuously for 24 hours at room temperature. At the end of the first and twenty-fourth hour of operation a sample of air, per section 5.5, shall be introduced into the instrument and the time required for operation of the alarm circuit or control circuit shall not exceed 30 seconds.

7.2. *Suction variation.* The instrument shall be operated continuously by varying the suction from 25% below to 25% above the rated. At each of these values a sample of air, per section 5.5, shall be introduced into the instrument and the time required for operation of the alarm circuit or control circuit shall not exceed 30 seconds.

7.3. *Voltage variation.* The instrument shall be operated with the voltage varying from 110% to 85% of the rated voltage. The instrument shall then be tested with an air sample, per section 5.5, and the response time shall not exceed 30 seconds.

7.4. *High temperature.* The instrument shall be exposed to a temperature of 70° C. for a period of 6 hours after which it shall be tested with air at 60° C. for a period of 30 minutes without giving a false alarm. The instrument shall then be tested with an air sample, per section 5.5, and the response time shall not exceed 30 seconds.

7.5. *Low temperature.* The instrument shall be exposed to a temperature of −65° C. for a period of 24 hours, after which it shall be raised to a temperature of −55° C. for a period of 6 hours. After operating for 30 minutes at a temperature −55° C., without giving a false alarm, the response time to the air sample in section 5.5 shall not exceed 30 seconds.

7.6. *Humidity.* The instrument shall be subjected to an atmosphere 32° C. with a relative humidity of 95%, with the air sample being taken from the same atmosphere. After operating in this manner for 5 hours, an air sample per section 5.5, shall be introduced into the instrument and the time required for operation of the alarm circuit or control circuit shall not exceed 30 seconds.

7.7. *Altitude effect.* The instrument shall be subjected to an altitude pressure equivalent to 40,000 feet. After operating in this manner continuously for five hours the time required for reaction of the alarm circuit or control circuit, on a sample of air per section 5.5, shall not exceed 30 seconds.

7.8. *Vibration.* The instrument shall be mounted on a vibration stand, in its own shock-mounted base, if provided with one, in its normal operating plane. The test shall be conducted with the instrument in normal operation condition. The instrument shall be subjected to vibration with an amplitude between 0.003 and 0.005 inch at frequencies from 500 to 3,000 cycles per minute, in order to determine whether the natural frequency of the instrument does occur in this frequency range.

7.9. *Vibration endurance.* With the instrument mounted on a vibration stand, per section 7.8 and with the instrument in a normal operating condition, it shall be vibrated continuously at a total amplitude of 0.03 inch for a period of 24 hours at the natural frequency, if applicable, as determined in section 7.8, or if not applicable at a frequency of 2,000 cycles per minute. At the completion of this test the instrument shall be examined to determine that no looseness in the mechanism nor damage to any part has resulted from the vibration and also, it shall be subjected to a sample of air introduced into it as per section 5.5 and the response time shall not exceed 30 seconds.

(2) *Exceptions.* Section 4.1.1, *Design.* Second sentence of Type II: "It shall include an alarm circuit or control circuit which will indicate the presence of contamination which reduces the light transmission to not less than 84 percent nor more than 96 percent of that of clear air.

Section 5.5, *Air sample.* Subparagraph (2): "Air containing smoke or gas having a light transmission value of 84 percent to 96 percent of that of clear air. A bar placed across light path to provide necessary light cut-off which has been calibrated against smoke may be used in place of actual smoke samples."

Section 7.3, *Voltage variation.* "The instrument may be operated with the voltage varying from 110 percent to 90 percent of the rated voltage. The response time to an air sample per section 5.5 shall not exceed 30 seconds."

Section 7.4, *High temperature.* "An air temperature of 45° C. is acceptable for the test after six hours of exposure at 70° C. The response time to an air sample per section 5.5 shall not exceed 30 seconds."

Section 7.5, *Low temperature.* "The instrument may be exposed to a temperature of −54° C. for a period of 24 hours after which time it shall be operated for a period of 30 minutes at −54° C. without giving a false alarm. The response time to an air sample per section 5.5 shall not exceed 30 seconds."

(3) *Application.* (i) Smoke detectors complying with the specifications appearing in this order are hereby approved for all aircraft. Smoke detectors already approved by the Administrator may continue to be installed in aircraft:

(*a*) For which an application for original type certificate is made prior to the effective date of this order.

(*b*) The prototype of which is flown within 1 year after the effective date of this order, and

(*c*) The prototype of which is not flown within 1 year after the effective date of this order if due to causes beyond the applicant's control.

(ii) If a major change is made in the installation within 9 months after the effective date of this order involving a change in type or model of smoke detector, previously approved types of smoke detectors may be installed. However, in any such change made after the 9-month period, new types of smoke detectors installed shall meet the specifications contained in this section.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, each smoke detector shall be permanently marked with the Technical Standard Order designation, "CAA–TSO–C1a" to identify the smoke detector as meeting the requirements of this order in accordance with the manufacturer's statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for the smoke detector have been met.

(2) *Data requirements.* Ten copies of the following technical information shall be submitted to the Civil Aeronautics Administration, Aircraft and Components Service, Attn: A–298, Washington 25, D. C.:

Installation recommendations prepared by the manufacturer covering the

proper location, mounting, test circuits, and related technical information essential to insure proper functioning and maintenance of the unit as installed in the aircraft.

(3) *Effective date.* After June 1, 1948, specifications contained in this Technical Standard Order will constitute the basis for Civil Aeronautics Administration approval of smoke detectors for use in certificated aircraft.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Director, Aircraft and Components Service, Office of Safety Regulation, Civil Aeronautics Administration. These requests should be addressed to the nearest regional office of the Civil Aeronautics Administration, Attn: Superintendent, Aircraft and Components Branch.

(5) *Conformance.* (i) The manufacturer shall furnish to the CAA (address as noted under "Data requirements" above), a written statement of conformance signed by a responsible official of his company, setting forth that the smoke detector to be produced by him meets the minimum safety requirements established in this order. Immediately thereafter distribution of the smoke detector conforming with the terms of this order may be started and continued.

(ii) The prescribed identification on the smoke detector does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the smoke detector in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Staff, Washington 25, D. C.

§ 514.2 *Technical Standard Order C2a: "Airspeed Indicator (Pitot Static)"*—(a) *Introduction.* Under section 601 of the Civil Aeronautics Act of 1938, as amended, and Parts 3, 4a, 4b, and 6 of this title, the Administrator of Civil Aeronautics is authorized to adopt standards for airspeed indicators intended for use in civil aircraft. In adopting these standards, consideration has been given to existing Government and industry standards for airspeed indicators.

(b) *Directive*—(1) *Provision.* The performance requirements for airspeed indicators, as set forth in sections 6 and 7 of SAE Specification AS–391A, Airspeed Indicator (pitot static) revised February 1, 1949,[1] stated below, are hereby established as minimum safety performance standards for airspeed indicators intended for use in civil aircraft:

1. *Purpose.* To specify minimum requirements for Pitot Static Pressure Type of Airspeed Indicators for use in aircraft, the operation of which may subject the instruments to the environmental conditions specified in Section 3.3.

2. *Scope.* This specification covers six types of instruments as follows:

Type I: 30–250 miles per hour range.
Type II: 40–300 miles per hour range.
Type III: 50–400 miles per hour range.
Type IV: 50–450 miles per hour range.
Type V: 50–700 miles per hour range.
Type VI: 50–425 knots range.

3. *General requirements.*

3.1 *Materials and workmanship.*

3.1.1 *Materials.* Materials shall be of a quality which experience and/or tests have demonstrated to be suitable and dependable for use in aircraft instruments.

3.1.2 *Workmanship.* Workmanship shall be consistent with high grade aircraft instrument manufacturing practice.

3.2 *Identification.* The following information shall be legibly and permanently marked on the instrument or attached thereto:

(a) Name of instrument (airspeed indicator).
(b) SAE Specification, AS 391A.
(c) Manufacturer's part number.
(d) Manufacturer's serial number or date of manufacture.
(e) Manufacturer's name or trademark.
(f) Range.

3.3 *Environmental conditions.* The following are established design requirements only. All tests shall be conducted as specified in sections 5, 6, and 7.

3.3.1 *Temperature.* When installed in accordance with the instrument manufacturer's instructions, the instrument shall function over the range of ambient temperatures from −30° C. to 50° C. and shall not be adversely affected by exposure to temperatures of −65° C. and 70° C.

3.3.2 *Humidity.* The instrument shall function and shall not be adversely affected when exposed to any relative humidity in the range from 0 to 95 percent at a temperature of approximately 32° C.

3.3.3 *Altitude.* The instrument shall function and shall not be adversely affected when subjected to a pressure and temperature range equivalent to −1,000 feet to 40,000 feet standard altitude, except as limited by the application of 3.3.1.

3.3.4 *Vibration.* When installed in accordance with the instrument manufacturer's instructions, the instrument shall function and shall not be adversely affected when subjected to vibrations of not more than 0.010 inch at a frequency from 500 to 3,000 cycles per minute[2] or of not more than 1.3 g. When specified by the purchaser for use in rotary wing aircraft, the frequency range shall be 150–3,000 cycles per minute.

3.4 *Magnetic effect.* The magnetic effect of the indicator shall not adversely affect the operation of other instruments installed in the same aircraft.

4. *Detail requirements.*

4.1 *Pressure equivalents.* These instruments shall be calibrated to indicate airspeed in accordance with the following pressure equivalents (tables I and II).

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West 39th St., New York, N. Y.

[2] It is understood that the unit shall withstand vibrations at higher frequencies, but the acceleration values need not exceed those shown above.

TABLE I—DIFFERENTIAL PRESSURES FOR AIRSPEEDS IN M. P. H.

[Water and mercury at 15° C.]

Airspeed m. p. h.	Differential pressure		
	Inches of water	Inches of mercury	Pounds per square inch
20	0.197	0.0145	0.0071
40	.788	.0581	.0284
50	1.231	.0907	.0444
60	1.774	.1307	.0640
70	2.416	.1780	.0872
80	3.158	.2327	.1140
90	4.000	.2948	.1444
100	4.942	.3642	.1784
120	7.130	.5254	.2573
140	9.726	.7167	.3510
160	12.736	.9385	.4577
180	16.167	1.191	.5835
200	20.025	1.476	.7227
210	22.117	1.630	.7982
240	29.054	2.141	1.049
250	31.592	2.328	1.140
270	37.014	2.728	1.336
300	46.033	3.392	1.661
330	56.15	4.138	2.026
360	67.42	4.968	2.433
400	84.32	6.214	3.043
450	108.66	8.007	3.922
500	136.87	10.086	4.940
550	169.31	12.476	6.110
600	206.40	15.210	7.449
650	248.62	18.321	8.973
700	296.50	21.849	10.701

TABLE II—DIFFERENTIAL PRESSURES FOR AIRSPEEDS IN KNOTS

[Water and mercury at 15° C.]

Airspeed knots	Differential pressure		
	Inches of water	Inches of mercury	Pounds per square inch
50	1.634	0.1204	0.0590
60	2.354	.1735	.0850
70	3.207	.2363	.1157
80	4.192	.3089	.1513
90	5.310	.3913	.1916
100	6.563	.4836	.2368
120	9.475	.6982	.3420
140	12.94	.9535	.4670
160	16.95	1.249	.6117
180	21.54	1.587	.7774
200	26.71	1.968	.9640
210	29.51	2.175	1.065
240	38.84	2.862	1.402
250	42.27	3.115	1.526
270	49.59	3.654	1.790
300	61.82	4.556	2.231
330	75.61	5.572	2.729
360	91.03	6.708	3.285
400	114.33	8.425	4.126
420	127.21	9.374	4.591

4.2 *Indicating method.* These airspeed instruments shall indicate by a means of a pointer moving over a fixed dial. Sensitive types shall have, in addition, an under dial visible through an aperture in the fixed dial for indicating hundreds of miles per hour. Clockwise pointer motion shall indicate increasing airspeed.

4.3 *Visibility.* The pointer and all dial markings shall be visible from any point within the frustum of a cone whose side makes an angle of not less than 30° with the perpendicular to the dial, and whose small diameter is the aperture of the instrument case. The distance between the dial and the cover glass shall be a practical minimum and shall not exceed 0.187 of an inch.

4.4 *Dial markings.*

4.4.1 *Finish.* Unless otherwise specified luminescent (self activating) material shall be applied to all major graduations, numerals and pointer.

4.4.2 *Graduations.* Minor graduations shall be used at intervals not to exceed 5 miles per hour, up to the 300 miles per hour mark. Major graduations shall be used to indicate every 10 miles per hour up to 300 miles per hour.

4.4.3 *Numerals.* Sufficient numerals shall be marked to positively and quickly identify all graduations. Numerals shall distinctly indicate the graduations to which each applies.

4.4.4 *Instrument name.* The word "Airspeed" shall be marked and may be the same finish as the numerals. The inscription "m. p. h." or "knots" shall appear on the dial.

4.5 *Limitation of pointer movements.* The pointer movement shall be limited by stops in the mechanism in such a way that the pointer will not be permitted to rotate more than 10 degrees beyond the last graduation on the dial. Stops may also be incorporated in the instrument mechanism to limit counterclockwise motion of the pointer.

4.6 *Back of case markings.* The back of the case, adjacent to the connections shall be marked as follows:

P—Pitot pressure connection.

S—Static pressure connection.

5. *Test conditions.*

5.1 *Atmospheric conditions.* Unless otherwise specified, all tests required by this specification shall be conducted at an atmospheric pressure of approximately 29.92 inches of mercury, and at an ambient temperature of approximately 22° C. When tests are made with the atmospheric pressure or the temperature substantially different from these values allowances shall be made for the variations from the specified conditions.

5.2 *Vibration (to minimize friction).* Unless otherwise specified, all tests for performance may be made with the instrument subjected to a vibration of 0.002 to 0.005 inch amplitude at a frequency of 1,500 to 2,000 cycles per minute. The term amplitude as used herein indicates the total displacement from positive maximum to negative maximum.

5.3 *Preconditioning.* No pressure shall be applied to the diaphragm or any actuating element of the instrument, nor shall the diaphragm or other actuating elements be flexed or exercised for a period of 24 hours prior to the start of the tests of section 6.

5.4 *Vibration equipment.* Vibration equipment shall be used which will vibrate at any desired frequency between 500 and 3,000 cycles per minute and shall subject the instrument to vibration such that a point on the instrument case will describe, in a plane inclined 45° to the horizontal plane, a circle, the diameter of which is equal to the amplitude specified herein.

6. *Individual performance requirements.* All instruments shall be subjected to whatever tests the manufacturer deems necessary to demonstrate specific compliance with this specification including the following requirements where applicable.

6.1 *Scale error.* The instrument shall be tested for scale errors at the points of the scale indicated in table III. The tests shall be made by subjecting the instrument to the pressure specified to produce these readings, first with pressure increasing, then with pressure decreasing. With pressure increasing, the pressure shall be brought up to, but shall not exceed the pressure specified to give the desired reading. With pressure decreasing, the pressure shall be brought down to, but shall not fall below the pressure specified to give the desired reading. The errors at the test points shall not exceed the tolerances specified in table III.

6.2 *Friction.* The instrument shall be tested for friction at the test points indicated by an asterisk (*) in table III. The pressure shall be brought up to the desired reading and then held constant while two readings are taken; the first reading being taken before the instrument is vibrated, and the second one after the instrument is vibrated. The difference between any two readings shall not exceed the tolerance in table IV.

6.3 *Position.* A pressure equivalent to one quarter, one half and three quarters scale deflection shall be applied. The change in reading at each deflection produced by rotating the instrument from the vertical to the horizontal position, or 90 degrees to the right or left, while the instrument is vibrated shall not exceed the tolerance specified in table III.

6.4 *Leak.* With both the pitot pressure and static pressure connections simultaneously evacuated to 15 inches of mercury, the leakage shall not cause more than 0.4 inch of mercury pressure drop during a 10-second period. With the static pressure connection open, and pressure equivalent to full scale pointer deflection applied to the pitot pressure connection, the leakage shall not cause more than 1 m. p. h. decrease in indication during a one minute period.

7. *Qualification tests.* As many instruments as deemed necessary to demonstrate that all instruments will comply with the requirements of this section shall be tested in accordance with the manufacturer's recommendations:

7.1 *Low temperature.* The instrument shall be subjected to a temperature of −30° C. for a period of 3 hours. With the temperature held at −30° C. the instrument shall be tested for scale errors as described in paragraph 6.1. The errors at the test points shall not exceed the tolerances of table III by more than the amount specified in table IV.

7.2 *High temperature.* The instrument shall be subjected to a temperature of 50° C. for a period of 3 hours. With the temperature held at 50° C., the instrument shall be tested for scale errors as described in paragraph 6.1. The errors at the test points shall not exceed the tolerances of table III by more than the amount specified in table IV.

7.3 *Extreme temperature exposure.* The instrument shall, after alternate exposures to ambient temperatures of −65° C. and 70° C. for periods of 24 hours each and a delay of 3 hours at room temperature following completion of the exposure, meet the requirements of section 6.1. There shall be no evidence of damage as a result of exposure to the extreme temperatures specified herein.

7.4 *Vibration.* With a pressure applied, sufficient to give half scale deflection, the instrument shall be vibrated at 500 cycles per minute and describe a circle of 0.003–0.005 inch diameter. The frequency shall be slowly increased to 3,000 cycles per minute and then slowly decreased to 500 cycles per minute, to determine whether the natural frequency of the instrument is in this range. The drift of the pointer shall not exceed the tolerances of table IV and the instrument pointer shall not oscillate more than the tolerance specified in table IV. After three hours exposure to vibration amplitude as specified in section 3.4.4 and at natural frequency, if between 500 and 3,000 cycles per minute, otherwise at 2,000 cycles per minute, the instrument shall meet the requirements of section 6. No damage shall be evident after this test.

7.5 *Seasoning.* The instrument shall be subjected to one hundred applications of a differential pressure sufficient to produce approximately full scale deflection. Not less than one hour following this test the instrument shall be tested for scale errors as described in paragraph 6.1, except that the scale error test shall not exceed the tolerance specified in table III by more than the amount specified in table IV.

7.6 *Drift.* The instrument shall be subjected to a differential pressure sufficient to produce approximately ¾ scale deflection. After being subjected to a pressure for a period of one hour, the instrument shall be tested as described in paragraph 6.1 except scale errors shall be determined for increasing pressure only. The reading of the instrument shall not have increased by more than the amount specified in table IV.

7.7 *Low temperature exposure.* The instrument shall be subjected to a temperature of −65° C. for a period of 24 hours. With the temperature held at −65° C. the instrument shall function. In addition, after the temperature is raised to −30° C. and held for a period of 3 hours, the instrument shall meet the requirements of paragraph 7.1.

7.8 *Magnetic effect.* The magnetic effect of the instrument shall be determined in terms of the deflection of a free magnet, approximately 1½ inches long, in a magnetic field with a horizontal intensity of 0.18, plus or minus 0.01 gauss, when the indicator is held in various positions on an east-west line with its nearest part 5 inches from the center of the magnet. (An aircraft compass with the compensating magnets removed therefrom may be used as a free magnet for this test.) The maximum deflection of the magnet shall not exceed 1° for any pointer deflection.

7.9 *Humidity test.* The instrument shall be subjected to the extreme conditions specified in paragraph 3.4.2 for a period of 10 hours, after which it shall meet the requirements of section 6.

TABLE III—TOLERANCES

Test point	250 m.p.h.	300 m.p.h.	400–450 m.p.h.	700 m.p.h. 7 revs.	425 knots
40	2.5	2.5			
50	*2.5	*2.5	3	4.0	
60	2.0	2.0	*3	2.0	*2
70	2.0				
80	2.0	2.0	3	*2.0	
90	*2.0				
100	2.0	*2.0	*3	2.0	*2
120	2.0		3	2.0	
140	2.5	2.5	3		
150					3
160	*2.5	2.5	5	*2.5	
180	3.0	3.0	5		
200					*4
210	3.0	*4.0	*5	4	
240	3.0	4.0	5		
250	*3.0			*4	5
270		4.0	5		
300		*4.0	5	4	5
330			5		
350					5
360			5	4	
400			5	*4	5
425					5
450				4	
500				5	
550				6	
600				6	
650				*6	

*Reference Section 6.2.

TABLE IV—TOLERANCES

Test	Reference paragraph	Miles per hour				
		250	300	400–450	700 (7 rev.)	425 knots
Friction	6.2	3.0	3.5	3.5	3.5	4.0
Position	6.3	2.0	2.5	2.5	2.5	3.0
Vibration:						
Ptr. oscillation	7.3	2.0	2.0	2.0	1.5	3.0
Ptr. change		2.0	2.0	2.0	2.5	3.0
Temperature	7.1, 7.2	3.5	3.5	5.0	3.5	4.0
Drift	7.5	1.5	1.5	1.5	2.5	2.0
Seasoning	7.4	2.0	2.0	2.0	2.5	3.0

(2) *Application.* (i) Airspeed indicators complying with the specifications appearing in this section are hereby approved for all aircraft. Airspeed indicators already approved by the Administrator may continue to be installed in aircraft.

(*a*) For which an application for original type certificate is made prior to the effective date of this section,

(*b*) The prototype of which is flown within 1 year after the effective date of this section, and

(c) The prototype of which is not flown within 1 year after the effective date of this section if due to causes beyond the applicant's control.

(ii) If an alteration involving a change in type or model of airspeed indicator is made within 9 months after the effective date of this section, previously approved types of airspeed indicators may be installed. However, in any such change made after the 9-month period, new types of airspeed indicators installed in aircraft used in instrument flight shall meet the specifications contained in this section.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, each airspeed indicator shall be permanently marked with the Technical Standard Order designation, CAA–TSO–C2a, to identify the airspeed indicator as meeting the requirements of this section in accordance with the manufacturers' statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for airspeed indicators have been met.

(2) *Data requirements.* None.

(3) *Effective date.* After March 1, 1949, specifications contained in this section will constitute the basis for Civil Aeronautics Administration approval of airspeed indicators for use in certificated aircraft used in instrument flight.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this section, which affect the basic airworthiness of the component, should be submitted for approval by the Chief, Aircraft Division, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest Regional Office of the Civil Aeronautics Administration, Attention: Chief, Aircraft Division.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Division, Attention: W–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the airspeed indicators to be produced by him meet the minimum safety requirements established in this section. Immediately thereafter, distribution of the airspeed indicators conforming with the terms of this section may be started and continued.

(ii) The prescribed identification on the airspeed indicator does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the airspeed indicator in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this section are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Office, Washington 25, D. C.

§ 514.3 *Technical Standard Order C3a: "Turn-and-Bank Indicator"*—(a) *Introduction.* (1) Turn-and-bank indicators are in the class of aircraft components which the Administrator of Civil Aeronautics is authorized to approve in accordance with Parts 3, 4a, 4b, and 6 of this title.

(2) This Technical Standard Order is intended to serve as a criterion by which the product manufacturer can obtain Civil Aeronautics Administration approval of his turn-and-bank indicator.

(3) In the establishment of this Technical Standard Order, consideration has been given to existing Government and industry standards for turn-and-bank indicators for the purpose of adopting the performance requirements of one of the recognized aeronautical standards as the minimum safety requirements for turn-and-bank indicators which are intended for use in civil aircraft. The specification of the Society of Automotive Engineers for turn-and-bank indicators contains such requirements.

(b) *Directive*—(1) *Provision.* Pursuant to Parts 3, 4a, 4b, and 6 of this title, which authorize the Administrator to approve aircraft equipment, the performance requirements for turn-and-bank indicators as set forth in SAE Specification AS–395, Turn-and-Bank Indicator, dated July 1, 1947,[1] stated below, are hereby established as minimum safety requirements for turn-and-bank indicators which are intended for use in civil aircraft:

1. *Purpose.* To specify minimum requirements for turn and bank indicators for use in aircraft, the operation of which may subject the instruments to the environmental conditions specified in section 3.4.

2. *Scope.* This specification covers three basic types of instruments as follows:

Type I. Air driven.
Type II. DC operated.
Type III. AC operated.

3. *General requirements.*

3.1. *Materials and workmanship.*

3.1.1. *Materials.* Materials shall be of a quality which experience and/or tests have demonstrated to be suitable and dependable for use in aircraft instruments.

3.1.2. *Workmanship.* Workmanship shall be consistent with high grade aircraft instrument manufacturing practice.

3.2. *Radio interference.* The instrument shall not be the source of objectionable interference, under operating conditions at any frequencies used on aircraft, either by radiation or feed back, in radio sets installed in the same aircraft as the instrument.

3.3. *Identification.* The following information shall be legibly and permanently marked on the instrument or attached thereto:

(a) Name of instrument (Turn and bank indicator).
(b) SAE Specification, AS–395.
(c) Rating (nominal electric or vacuum, etc.).
(d) Manufacturer's part number.
(e) Manufacturer's serial number or date of manufacture.
(f) Manufacturer's name or trademark.

3.4. *Environmental conditions.* The following are established design criteria only. All tests shall be run as per sections 5, 6 and 7.

3.4.1. *Temperature.* When installed in accordance with the instrument manufacturer's instructions the instrument shall function over the range of ambient temperature from −30° C. to 50° C. and shall not be adversely affected by exposure to temperatures in the range of −65° C. to 70° C.

3.4.2. *Humidity.* The instrument shall function and shall not be adversely affected when exposed to a relative humidity of up to and including 95% at a temperature of approximately 32° C.

3.4.3. *Altitude.* The instrument shall function and shall not be adversely affected when subjected to a pressure and temperature range equivalent to −1,000 to 40,000 feet standard altitude except that the instrument temperature shall not be lower than −30° C.

3.4.4. *Vibration.* When installed in accordance with the instrument manufacturer's instructions the instruments shall function and not be adversely affected when subjected to vibrations of not more than 0.010 inch at a frequency from 500 to 3,000 cycles per minute or of not more than 1.3 g. When specified by the purchaser for use in rotary wing aircraft, the frequency range shall be 150–3,000 cycles per minute.

NOTE: It is understood that the unit shall withstand vibration at higher frequencies, but the acceleration values need not exceed those shown above.

4. *Detail requirements.*

4.1. *Indicating method.* Turns shall be indicated by means of a pointer, deflecting in direction of turn. Banks shall be indicated by means of a black ball, free to move in a curved transparent tube.

4.2. *Visibility.* Both bank and turn indications shall be visible from any point within the frustum of a cone whose side makes an angle of not less than 30 degrees with the perpendicular to the dial and whose small diameter is the aperture of the instrument case. The distance between the dial and the cover glass shall be a practical minimum and shall not exceed 0.187 inch.

4.3. *Dial markings.*

4.3.1. *Finish.* Unless otherwise specified, luminescent (self-activating) material shall be applied to all markings, pointer and the inclinometer backing.

4.3.2. *Letters.* Letters "L" and "R" shall be legibly marked on the dial.

4.3.3. *Instrument name.* The words "Turn and Bank" shall be marked and may be indicated in the same finish as the letters.

4.4. *Power variations* The instrument shall properly function with a voltage and frequency variation of ±10% of the rated value (provided the a. c. voltage and frequency vary in the same direction) and/or ±30% of the rated vacuum pressure.

5. *Test conditions.*

5.1. *Atmospheric conditions.* Unless otherwise specified, all tests required by this specification shall be made at an atmospheric pressure of approximately 29.92 inches of mercury and at an ambient temperature of approximately 22° C. When tests are made with atmospheric pressure or temperature substantially different from these values allowance shall be made for the variation from the specified conditions.

5.2. *Vibration (to minimize friction).* Unless otherwise specified all tests for performance may be made with the instrument subjected to a vibration of 0.002 to 0.005 inch amplitude at a frequency of 1,500 to 2,000 cycles per minute. The term amplitude as used herein indicates the total displacement from positive maximum to negative maximum.

5.3. *Vibration stand.* A vibration stand shall be used which will vibrate at any de-

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West Thirty-ninth Street, New York, N. Y.

sired frequency between 500 and 3,000 cycles per minute and shall subject the instrument to vibration such that a point on the instrument case will describe in a plane inclined 45 degrees to the horizontal plane, a circle, the diameter of which is equal to the amplitude specified herein.

5.4. *Turntable.* A turntable which can be operated smoothly through the ranges specified herein shall be used for making calibration tests.

5.5. *Power conditions.* Unless otherwise specified all tests for performance shall be conducted at the power rating recommended by the manufacturer.

5.6. *Normal operation.* All instruments shall be operated at normal power for at least five minutes prior to conducting any tests (unless otherwise specified).

6. *Individual performance requirements.* All instruments or components of such shall be subjected to whatever tests the manufacturer deems necessary to demonstrate specific compliance with this specification including the following requirements where applicable.

6.1. *Bank indicator zero position.* With the instrument in normal position with the lower mounting holes on a horizontal line, the position of the ball shall be within 1/32 inch of the zero position.

6.2. *Bank indicator friction.* The ball shall move smoothly and without sticking throughout the full length of the tube.

6.3. *Bank indicator visibility.* With the ball in the extreme position at each end of the tube at least one half of it shall be visible from a point 12 inches directly in front of the zero mark.

6.4. *Bank indicator filling.* The instrument shall be rotated so that all the air in the tube is trapped in the expansion chamber. Then, with the plane of the dial vertical, the instrument shall be rotated to an angle of roll of 45°. With the expansion chamber end of the tube low, no part of the air bubble shall be visible from a point 12 inches directly in front of the bank indicator zero position.

6.5. *Turn indicator starting.*

6.5.1. *Type I requirements.* The gyro rotor shall start to rotate and continue to run on a suction not to exceed 50% of rated value. Rated instrument performance speed shall be reached within five minutes after normal rated suction is applied.

6.5.2. *Types II and III requirements.* The gyro rotor shall start to rotate and continue to operate at a speed sufficient for proper performance of the instrument on an applied voltage not to exceed 80% of the rated voltage. This speed shall be reached within five minutes after application of the voltage.

6.6 *Turn indicator sensitivity, room temperature.* Starting in normal position and operating under rated power, the instrument shall be rotated about the vertical axis at the rates specified in Table I. Deflections of the turn indicator pointer shall be of the magnitude shown in Table I. Pointer motion shall be smooth.

6.7. *Dielectric test.* (Types II and III only.) The insulation shall be subjected to a dielectric test with a R. M. S. voltage at a commercial frequency applied for a period of five seconds equivalent to five times normal circuit operating voltage. Except where circuits include components for which such a test would not be appropriate, then the test voltage shall be 1.25 times normal circuit operating voltage. The insulation resistance shall not be less than 20 megohms at that voltage.

7. *Qualification tests.* As many instruments as deemed necessary to demonstrate that all instruments will comply with the requirements of this section shall be tested in accordance with the manufacturer's recommendations.

7.1. *Case leakage.* (Type I only.) A differential pressure of 15 inches of mercury between the inside and outside of the case shall not result in a leakage greater than that which will cause a pressure drop of 0.4 inch of mercury in 10 seconds.

7.2. *Bank indicator damping (room temperature).* When the instrument is suddenly rotated from a position of 12 degrees bank through the vertical to 12 degrees opposite bank, the time for the ball to move from the bank indicator zero position to the rest position at the end of the tube shall be 0.2 second or more.

7.3. *Bank indicator damping (low temperature).* The instrument shall be exposed without operating to a temperature of −65° C., for one hour. Then the instrument shall be tested as specified in Paragraph 7.2 except that the instrument shall operate at a temperature of −30° C. The time for ball motion from the zero position of the bank indicator to the rest position at the end of the tube shall not exceed four seconds.

7.4. *Bank indicator leakage.* The exposure of the instrument to a temperature of 70° C. for two hours shall not cause appreciable change in the size of the air bubble at room temperature.

7.5. *Magnetic effect.* The magnetic effect of the indicator shall be determined in terms of the deflection of a free magnet, approximately 1½ inches long, in a magnetic field with a horizontal intensity of 0.18 (±0.01) gauss when the indicator is held in various positions on an east-west line with its nearest part 5 inches from the center of the magnet. An aircraft compass with the compensating magnets removed therefrom may be used as the free magnet for this test. This test shall be made first with the instrument not operating and then shall be repeated with the instrument in normal operation. The maximum deflection of the magnet shall not exceed 2 degrees for any pointer position.

7.6. *Turn indicator damping, room temperature.* The instrument operating under rated power in normal position, shall be rotated about the vertical axis at a rate which causes full scale pointer deflection. The turn shall be stopped suddenly and the pointer shall return to the zero mark without crossing it in not less than two nor more than four seconds.

7.7. *Turn indicator sensitivity, low temperature.* After exposure to temperature of −30° C. for three hours, without operating, the instrument while still at −30 C. shall meet the requirements of paragraph 6.6 except that pointer deflection shall be as indicated in Table II. The performance shall be checked within ten minutes after power is applied. When turning is stopped the pointer shall return smoothly to zero within 1/32 inch.

7.8. *Turn indicator sensitivity, high temperature.* The conditions of paragraph 6.6 shall also be met at a test temperature of 70 C.

7.9. *Vibration.* With the gyro operating under rated power the instrument shall be vibrated at 500 cycles per minute and describe a circle of 0.003 to 0.005 inch diameter. The frequency shall be slowly increased to 3,000 cycles per minute and then decreased to 500 cycles per minute, to determine whether the natural frequency of the instrument occurs in this range. At no time shall the pointer leave the zero position more zero within 1/16 inch. After three hours exthan 1/32 inch, and the ball shall remain at posure to vibration amplitude as specified in section 3.4.4 and at the natural frequency of between 500 and 3,000 cycles per minute, otherwise at 2,000 cycles per minute, no damage shall be evident and the instrument shall meet the requirements of section 6.

7.10. *Humidity.* The instrument shall be operated under the extreme conditions specified in section 3.4.2 for a period of 10 hours after which it shall meet the requirements of section 6.

TURN INDICATOR SENSITIVITY

TABLE I

Reference: Paragraph 6.6:

Rate of turning (degree per minute):	*Deflection of pointer tip (inches)*
0	0±.015
36	1/16±1/64
180	5/16±1/64
360	1/2±1/16
1,080	1±1/8

TABLE II

Reference: Paragraph 7.7:

Rate of turning:	*Deflection of pointer tip (inches)*
180°	5/16±1/16
360°	1/2±1/8

(2) *Application.* (i) Turn-and-bank indicators complying with the specifications appearing in this Technical Standard Order are hereby approved for all aircraft. Turn-and-bank indicators already approved by the Administrator may continue to be installed in aircraft,

(*a*) For which an application for original type certificate is made prior to the effective date of this order,

(*b*) The prototype of which is flown within 1 year after the effective date of this order, and

(*c*) The prototype of which is not flown within 1 year after the effective date of this order if due to causes beyond the applicant's control.

(ii) If a major change is made in the installation within 9 months after the effective date of this order involving a change in type or model of turn-and-bank indicator, previously approved types of turn-and-bank indicators may be installed. However, in any such change made after the 9-month period, new types of turn-and-bank indicators installed in aircraft used in instrument flight shall meet the specifications contained in this section.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, each turn-and-bank indicator shall be permanently marked with the Technical Standard Order designation "CAA–TSO–C3" to identify the turn-and-bank indicator as meeting the requirements of this order in accordance with the manufacturer's statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for turn-and-bank indicators have been met.

(2) *Data requirements.* None.

(3) *Effective date.* After July 1, 1948, specifications contained in this Technical Standard Order will constitute the basis for Civil Aeronautics Administration approval of turn-and-bank indicators for use in certificated aircraft used in instrument flight.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Director, Aircraft and Components Service, Office of Safety Regulation, Civil Aeronautics Administration. These requests should

be addressed to the nearest regional office of the Civil Aeronautics Administration, Attn: Superintendent, Aircraft and Components Branch.

(5) *Conformance.* (i) The manufacturer shall furnish to the CAA, Aircraft and Components Service, A–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the turn-and-bank indicator to be produced by him meets the minimum safety requirements established in this order. Immediately thereafter distribution of the turn-and-bank indicator conforming with the terms of this order may be started and continued.

(ii) The prescribed identification on the turn-and-bank indicator does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the turn-and-bank indicator in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Staff, Washington 25, D. C.

§ 514.4 *Technical Standard Order C4b: "Bank and Pitch Indicator (Stabilized Type) (Gyro Horizon, Altitude Gyro)".*—(a) *Introduction.* Under section 601 of the Civil Aeronautics Act of 1938, as amended, and Parts 4a and 4b of this title, the Administrator of Civil Aeronautics is authorized to adopt standards for bank and pitch indicators intended for use in civil aircraft. In adopting these standards, consideration has been given to existing Government and industry standards for bank and pitch indicators.

(b) *Directive*—(1) *Provision.* The performance requirements for bank and pitch indicators, as set forth in sections 6 and 7 of SAE Specification AS–396 Bank and Pitch Indicator, dated August 1, 1947,[1] stated below, with the exceptions noted in subdivision (i) of this subparagraph are hereby established as minimum safety performance standards for bank and pitch indicators intended for use in civil aircraft:

1. *Purpose.* To specify minimum requirements for gyroscopically stabilized bank and pitch indicators for use in aircraft, the operation of which may subject the instrument to the environmental conditions specified in section 3.4.

2. *Scope.* This specification covers two basic types as follows:

Type I. Having limited freedom of operation.

Type II. Having unlimited freedom of operation.

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West 39th St., New York, N. Y.

3. *General requirements.*

3.1. *Material and workmanship.*

3.1.1. *Materials.* Materials shall be of a quality which experience and/or tests have demonstrated to be suitable and dependable for use in aircraft instruments.

3.1.2. *Workmanship.* Workmanship shall be consistent with high-grade aircraft instrument manufacturing practice.

3.2. *Radio interference.* The instrument shall not be the source of objectionable interference, under operating conditions at any frequencies used on aircraft, either by radiation or feed-back, in radio sets installed in the same aircraft as the instrument.

3.3. *Identification.* The following information shall be legibly and permanently marked on the instrument or attached thereto:

(a) Name of instrument.
(b) S. A. E. Spec. AS 396.
(c) Rating (electrical, vacuum, etc.).
(d) Manufacturer's part number.
(e) Manufacturer's serial number or date of manufacture.
(f) Manufacturer's name and/or trademark.

3.4. *Environmental conditions.* The following conditions have been established as design criteria only. Tests shall be conducted as specified in sections 5, 6 and 7.

3.4.1. *Temperature.* When installed in accordance with the instrument manufacturer's instructions the unit shall function over the range of ambient temperatures shown in column A below and shall not be adversely affected by exposure to the temperatures shown in column B below:

Instrument location	A	B
Heated areas (temperature controlled)	−30° to 50° C.	−65° to 70° C.
Unheated areas (temperature uncontrolled)	−55° to 70° C.	−65° to 70° C.

3.4.2. *Humidity.* The instrument shall function and not be adversely affected when exposed to a relative humidity up to and including 90 percent at a temperature of approximately +32° C.

3.4.3. *Altitude.* The instrument shall function and not be adversely affected when subjected to a pressure and temperature range equivalent to −1,000 to +40,000 feet standard altitude, except as limited by application of section 3.4.1.

3.4.4. *Vibration.* When installed in accordance with the instrument manufacturer's instructions, the units shall function and shall not be adversely affected when subject to the following vibrations:

Type of instrument mounting	Cycles per minute [1]	Amplitude [1]	Maximum acceleration
		Inch	
Shock mounted panel instruments	500–3000	0.005	0.8 g
Unshock mounted panel instruments	500–3000	.010	1.3 g
Structure mounted instruments	500–3000	.030	3.8 g

[1] It is understood that the unit shall withstand vibration at higher frequencies, but the acceleration value need not exceed those shown above.

When specified by the purchaser for use in rotary wing aircraft, the frequency range shall be 150–3,000 cycles per minute.

4. *Detail requirements.*

4.1. *Indicating method.* One of the following methods of indication shall be employed:

Method I—Horizontal bar which moves with respect to a fixed pitch reference marker. At the top of the dial, a pointer which moves angularly with respect to the bezel mask. Horizontal bar appears to move toward top of instrument face for dive and appears to rotate clockwise for left bank. Banking pointer appears to rotate clockwise for left bank.

Method II—Spherical dial which moves with respect to a fixed reference marker. The spherical dial appears to move down for dive and appears to rotate clockwise for left bank.

4.2. *Operating range.*

Type I—The useful operating range and the indicating range of the instrument shall be at least plus or minus 60 degrees in pitch and at least plus or minus 90 degrees in roll.

Type II—The useful operating range of the instrument shall be through 360 degrees in pitch and 360 degrees in roll. The range of indication in pitch for Method I indication shall be at least plus or minus 25 degrees and for Method II it shall be 360 degrees.

4.3. *Dial markings.*

4.3.1. *Increments.*

Type I—Right and left bank graduations shall be provided at intervals not to exceed 30 degrees between 0 and 90 degrees.

Type II—Bank graduations shall be as specified for Type I above. In addition, the sphere shall be graduated at intervals not to exceed 30 degrees from 0 to 90 degrees above and below the horizontal centerline.

4.3.2. *Visibility.* Index and dial markings shall be visible from any point within the frustum of a cone the side of which makes an angle of 30 degrees with the perpendicular to the dial and small diameter of which is the aperture of the instrument case.

4.3.3. *Finish.* Unless otherwise specified, luminescent material (self-activating) shall be applied to major graduations and numerals.

4.4. *Power variation.* All units shall properly function with ±15% variation in D. C. voltage and/or 10% variation in A. C. voltage and frequency, provided the A. C. voltage and frequency vary in the same direction.

4.5. *Turn error.* The pitch or bank indication error resulting from a coordinated turn of 180 degrees in 1 minute at a true airspeed of 180 m. p. m. shall not exceed 5 degrees.

4.6. *Gyro caging provisions.* Unless the gyro assembly has unrestricted freedom of operation in the pitch and roll axes, means shall be provided for caging and/or releveling the gyro. Means shall be provided to indicate when the gyro is caged, except when it is not possible to leave the gyro in caged condition.

4.7. *Power indication.* Means shall be provided to permit the operation of a device to indicate whether the instrument is receiving power.

5. *Test conditions.*

5.1. *Atmospheric conditions.* Unless otherwise specified, all tests required by this specification shall be made at an atmospheric pressure of approximately 29.92 inches of mercury and at an ambient temperature of approximately 220. When tests are made with the atmospheric pressure or the temperature substantially different from these values, allowance shall be made for the variation from the specified conditions.

5.2. *Vibration (to minimize friction).* Unless otherwise specified, all tests for performance may be made with the instrument subjected to a vibration of 0.002 to 0.005 inch amplitude at a frequency of 1,500 to 2,000 cycles per minute. The term amplitude as used herein indicates the total displacement from positive maximum to negative maximum.

5.3. *Power conditions.* Unless otherwise specified, all tests for performance shall be conducted at the power rating recommended by the manufacturer.

5.4. *Position.* Unless otherwise specified, all tests shall be made with the instrument in normal level position.

5.5. *Vibration stand.* For vibration tests a stand shall be used which will vibrate at any desired frequency between 500 and 8,000 cycles per minute and shall subject the in-

strument to vibration such that a point on the instrument case will describe, in a plane inclined 45 degrees to the horizontal plane, a circle, the diameter of which is equal to the amplitude specified herein.

6. *Individual performance requirements.* All instruments, or components of such, shall be subjected to whatever tests the manufacturer deems necessary to demonstrate specific compliance with this specification, including the following requirements where applicable:

6.1. *Starting.* The gyro rotor shall start to rotate and continue to run on application of 50 percent of rated suction for air operated instruments and 80 percent of rated voltage for electrically operated instruments. Rated instrument performance speed shall be reached within 3 minutes after normal rated power is applied.

6.2. *Roll, pitch and yaw.* When the gyro has erected and attained equilibrium speed, and the instrument has been oscillated through an angle of $\pm 7\frac{1}{2}$ degrees about each axis at a frequency of 5 to 7 cycles per minute for 10 minutes and then returned to level position, the alignment of the bank pointer (or vertical centerline of sphere) with their respective zero reference markers shall be within one degree.

6.3. *Climbing and driving.* With the instrument level, the gyro running at equilibrium speed and the gyro offset to the 20 degree climb indication, the time required for the gyro to erect to the 10 degree climb indication shall not exceed 8 minutes.

The time required to erect from the 10 degree climb indication to the zero pitch indication shall not exceed 12 minutes.

6.4. *Banking.* With the instrument level, the gyro running at equilibrium speed and the gyro offset to the 20 degree right bank indication, the time required for the gyro to erect to the 10 degree right bank indication shall not exceed 8 minutes.

The time required to erect from the 10 degree right bank indication to the zero bank indication (within 1 degree) shall not exceed 12 minutes.

The same tolerances shall apply when the gyro is offset to the 20 degree left bank indication and allowed to erect to the zero bank indication.

6.5. *Dielectric test.* The instrument shall be subject to a dielectric test with a R. M. S. voltage equivalent to five times operating voltage, but at a commercial frequency, applied between each ungrounded terminal and the instrumept case for a period of 5 seconds. The breakdown resistance shall not be less than 20 megohms at that voltage (A. C. or D. C. as applicable).

7. *Qualification tests.* As many instruments as deemed necessary to demonstrate that all instruments will comply with the requirements of this section shall be tested in accordance with the manufacturer's recommendations.

7.1. *Low temperature operation.* After exposure to an ambient temperature of −30° C. for 5 hours, without operating, the instrument shall start upon application of rated power and at that temperature shall meet the requirements of section 6.2 except that the allowable alignment tolerances shall be 2 degrees.

7.2. *High temperature operation.* The requirements of section 7.1 shall apply except that the ambient temperature for exposure and test shall be 50° C.

7.3. *Extreme temperature exposure.* After 3 hours at room temperature following alternate exposures to ambient temperatures of −65° C. and 70° C. for 24 hours each, without operating, the instrument shall meet the requirements of section 6.2. No damage shall have resulted from the extreme temperature exposure specified herein.

7.4. *Magnetic effect.* The magnetic effect of the indicator shall be determined in terms of the deflection of a free magnet, approximately $1\frac{1}{2}$ inches long, in a magnetic field with a horizontal intensity of 0.18 (± 0.01) gauss when the indicator is held in various positions on an east-west line with its nearest part 5 inches from the center of the magnet. This test shall first be made with the indicator not operating and then shall be repeated with the indicator in normal operation. The maximum deflection of the free magnet shall not exceed 5 degrees for any indicating or reference position.

7.5. *Humidity.* After operating under the extreme condition specified in section 3.4.2 for 10 hours, the instrument shall meet the requirements of section 6.2.

7.6. *Vibration.* The instrument(s) shall be subjected, while in normal operation, to vibration with an amplitude of 0.005 inch at frequencies from 1,000 to 3,000 cycles per minute in order to determine whether the natural frequency of the instrument(s) is in this frequency range. After 3 hours' exposure to vibration amplitudes as specified in section 3.4.4 and at the natural frequency, if between 1,000 and 3,000 c. p. m., otherwise at 2,000 c. p. m., the instrument(s) shall meet the requirements of section 6.1, 6.2 and 6.3. No damage shall be evident after this test.

(i) *Exceptions.* (*a*) Section 6.5 Dielectric Test. Last sentence: "The breakdown resistance shall not be less than 5 megohms at that voltage (A. C. or D. C. as applicable)."

(*b*) Section 7.5 Humidity. External filters may be used when necessary in the humidity test.

(2) *Application.* (i) Bank and pitch indicators complying with the specifications appearing in this order are hereby approved for all aircraft. Bank and pitch indicators already approved by the Administrator may continue to be installed in aircraft:

(*a*) For which an application for original type certificate is made prior to the effective date of this order,

(*b*) The prototype of which is flown within one year after the effective date of this order, and

(*c*) The prototype of which is not flown within one year after the effective date of this order if due to causes beyond the applicant's control.

(ii) If an alteration involving a change in type or model of bank and pitch indicator is made within nine months after the effective date of this order, previously approved types of bank and pitch indicators may be installed. However, in any such change made after the nine month period, new types of bank and pitch indicators installed in aircraft used in instrument fight shall meet the specifications contained in this section.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, each bank and pitch indicator shall be permanently marked with the Technical Standard Order designation, CAA–TSO–C4b, to identify the bank and pitch indicator as meeting the requirements of this order in accordance with the manufacturers' statement of conformance outlined in subparagraph (5) of this paragraph. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for bank and pitch indicators have been met.

(2) *Data requirements.* None.

(3) *Effective date.* After May 1, 1949, specifications contained in this order will constitute the basis for Civil Aeronautics Administration approval of bank and pitch indicators for use in certificated aircraft used in instrument flight.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Chief, Aircraft Division, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest Regional Office of the Civil Aeronautics Administration, Attention: Chief, Aircraft Division.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Division, Attention: W–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the bank and pitch indicator to be produced by him meets the minimum safety requirements established in this order. Immediately thereafter distribution of the bank and pitch indicator conforming with the terms of this order may be started and continued.

(ii) The prescribed identification on the bank and pitch indicator does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the bank and pitch indicator in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Office, Washington 25, D. C.

§ 514.5 *Technical Standard Order C5b: "Direction Indicator, Non-Magnetic, Stabilized Type (Directional Gyro)"*—(a) *Introduction.* Under section 601 of the Civil Aeronautics Act of 1938, as amended, and Parts 4a and 4b of this title, the Administrator of Civil Aeronautics is authorized to adopt standards for non-magnetic direction indicators intended for use in civil aircraft. In adopting these standards, consideration has been given to existing Government and industry standards for non-magnetic direction indicators.

(b) *Directive*—(1) *Provision.* The performance requirements for non-magnetic direction indicators, as set forth in sections 6 and 7 of SAE Specification AS–397, Direction Indicator, Non-Magnetic, Stabilized Type (Directional Gyro) dated February 1, 1947,[1] stated below, with the exceptions noted in subdivision (i) of this subparagraph, are hereby es-

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West 39th St., New York, N. Y.

tablished as minimum safety performance standards for non-magnetic direction indicators intended for use in civil aircraft:

1. *Purpose.* To specify minimum requirements for non-magnetic gyroscopically stabilized direction indicators for use in aircraft.

2. *Scope.* This specification covers two basic types as follows:

Type I. Air operated.

Type II. Electrically operated.

3. *General requirements:*

3.1. Material and workmanship.

3.1.1. *Materials.* Materials shall be of a quality which experience and/or tests have demonstrated to be suitable and dependable for use in aircraft instruments.

3.1.2. *Workmanship.* Workmanship shall be consistent with high-grade aircraft instrument manufacturing practice.

3.2. *Radio interference.* The instrument shall not be the source of objectionable interference, under operating conditions at any frequencies used on aircraft, either by radiation or feed-back, in radio sets installed in the same aircraft as the instrument.

3.3. *Identification.* The following information shall be legibly and permanently marked on the instrument or attached thereto:

(a) Name of instrument.

(b) SAE Spec. AS 397.

(c) Rating (electrical, vacuum, etc.).

(d) Manufacturer's part number.

(e) Manufacturer's serial number or date of manufacture.

(f) Manufacturer's name and/or trade mark.

3.4. *Environmental conditions.*

3.4.1. *Temperature.* The instrument shall function over the temperature range −30° C. to +50° C. and shall not be adversely affected by exposure to temperatures in the range −65° C. to +70° C.

3.4.2. *Humidity.* The instrument shall function and not be adversely affected when exposed to a relative humidity up to and including 95 percent at a temperature of approximately 32° C.

3.4.3. *Altitude.* The instrument shall function and not be adversely affected when subjected to a pressure range equivalent to −1,000 feet to +40,000 feet standard altitude.

3.4.4. *Vibration.* The instrument shall function and not be adversely affected when subjected to vibration of 0.005 inch maximum amplitude at frequencies of 150–3,000 cycles per minute. The instrument shall withstand vibration, at higher frequencies, having acceleration values not to exceed 0.8 g.

4. *Detailed requirements.*

4.1. *Indicating method.* One of the following methods of indication shall be employed:

Method I. Horizontal drum dial with fixed lubber's lines. Graduations move to the right for right turns.

Method II. Rotating vertical dial with fixed lubber's line at the top. Dial rotates counterclockwise for right turns.

Method III. Rotating pointer with fixed graduated dial. Pointer rotates clockwise for right turns.

4.2. *Operating limits.* The instrument shall indicate throughout the 360-degree scale range, during dives, climbs or banks up to at lease 55 degrees displacement from level flight.

4.3. *Dial markings.*

4.3.1 *Increments.* Degree graduations shall be provided at intervals not to exceed 5 degrees with major graduations at 10, 20, 30, etc., degrees and with legible numerals at intervals not greater than 30 degrees throughout the scale range of 360 degrees. In the numerical marking the last digit (zero) shall be omitted. (Thus, 6 at 60 degrees, 9 at 90 degrees, etc.)

4.3.2. *Visibility.* Index and dial markings shall be visible from any point within the frustum of a cone the side of which makes an angle of 30 degrees with the perpendicular to the dial and the small diameter of which is the aperture of the instrument case. At least two numerals shall be simultaneously visible.

4.3.3. *Finish.* Unless otherwise specified, luminescent material shall be applied to major graduations and numerals.

4.4. *Course setting provisions.* A means shall be provided for manually setting the directional indicator dial (or pointer) indication to any heading desired.

4.5. *Gyro caging provisions.* Unless the gyro assembly has unrestricted freedom of operation in the pitch and roll axes, means shall be provided for caging and releveling the gyro should it become upset by operation beyond its limits. A conspicuous warning device shall indicate when the instrument is caged, except when it is not possible to leave the instrument in caged condition.

4.6. *Power indication.* Suitable internal or external means shall be provided for operating a device to indicate whether the instrument is receiving power.

5. *Test conditions.*

5.1. *Atmospheric conditions.* Unless otherwise specified, all tests required by this specification shall be made at an atmospheric pressure of approximately 29.92 inches of mercury and at an ambient temperature of approximately 22° C. When tests are made with the atmospheric pressure or the temperature substantially different from these values, allowance shall be made for the variation from the specified conditions.

5.2. *Vibration.* Unless otherwise specified, all tests for performance may be made with the instrument subjected to a vibration of 0.002 to 0.004 inch amplitude at a frequency of 1,500 to 2,000 cycles per minute. The term amplitude as used herein indicates the total displacement from positive maximum to negative maximum.

5.3. *Power conditions.* Unless otherwise specified, all tests for performance shall be conducted at the power rating recommended by the manufacturer.

6. *Individual performance tests.* All Type I and Type II instruments shall meet the requirements of the following individual tests where applicable.

6.1. *Type I requirements.*

6.1.1. *Starting.* The gyro rotor shall start to rotate and continue to run on a suction not to exceed 50 percent of rated value. Rated instrument performance speed shall be reached within two minutes after normal rated suction is applied.

6.1.2. *Roll, pitch and yaw.* The instrument shall be mounted on a test platform which is adjusted to oscillate in roll, pitch and yaw, with a total amplitude of 3 degrees about each axis, at a frequency of 5 to 7 oscillations per minute. With the platform level, and the gyro operating at equilibrium speed and uncaged, the dial (or pointer) reading shall be noted. The platform shall then be started in its roll, pitch and yaw movement. At the end of a ten minute period the oscillation shall be stopped, the platform realigned to its starting position, and the instrument dial (or pointer) reading noted. The amount of drift of the dial (or pointer) in either direction during the ten minute test period shall not exceed 4 degrees.

6.1.3. *Heading stability.* The instrument shall be mounted on a turn table, tilted 54 (±1) degrees from the vertical and the reading noted. The turn table shall be rotated one complete revolution about its vertical axis at 360 (±30) degrees per minute and the drift of the dial (or pointer) shall not exceed two degrees. The test shall be repeated rotating the turn table in the opposite direction.

6.2. *Type II requirements.*

6.2.1. *Starting.* The gyro rotor shall start to rotate and continue to operate at a speed sufficient for proper performance of the instrument on an applied voltage not to exceed 80 percent of the rated voltage. This speed shall be reached within two minutes after application of this voltage.

6.2.2. *Roll, pitch and yaw.* Same as for Type I.

6.2.3. *Heading stability.* Same as for Type I.

6.2.4. *Dielectric.* The instrument shall be subjected to a dielectric test with a R. M. S. voltage equivalent to five times operating voltage but at a commercial frequency applied between each terminal and the instrument case for a period of 5 seconds. The breakdown resistance shall not be less than 20 megohms at that voltage (A. C. or D. C. as applicable).

7. *Qualification tests.* As many instruments as appears necessary to demonstrate that all instruments will comply with the requirements of this section shall be subjected to the following additional tests:

7.1. *Low temperature operation.* The instrument shall be placed in a low temperature apparatus which will hold it in a level attitude. The instrument shall be subjected for a period of 2 hours to a temperature of −30° C. without operating. At the end of that period the instrument shall be started by application of rated power. The amount of drift of the dial (or pointer) in either direction during a 10-minute period shall not exceed 5 degrees.

7.2. *High temperature operation.* The foregoing test shall be repeated at a temperature of 50° C.

7.3. *Extreme temperature exposure.* The instrument shall first be subjected to the Roll, Pitch and Yaw Test specified in section 6 and shall meet the requirements of that test. The instrument shall then be subjected for a period of 24 hours to a temperature of −65° C. without operating. Upon completion of this exposure the instrument shall be returned to room temperature. After a period of not less than three hours the instrument shall be subjected for a period of 24 hours to a temperature of 70° C. without operating. Upon completion of this exposure the instrument shall be returned to room temperature. After a period of not less than three hours the instrument shall again be subjected to the Roll, Pitch and Yaw Test of section 6 and shall meet the requirements of that test. The instrument shall then be examined and shall not show evidence of damage as a result of exposure to the extreme temperatures specified herein.

7.4. *Magnetic effect.* The magnetic effect of the indicator shall be determined in terms of the deflection of a free magnet, approximately 1½ inches long, in a magnetic field with a horizontal intensity of 0.18 (±0.01) gauss when the indicator is held in various positions on an east-west line with its nearest part 5 inches from the center of the magnet. An aircraft compass with the compensating magnets removed therefrom may be used as the free magnet for this test. This test shall be made first with the instrument not operating and then shall be repeated with the instrument in normal operation. The maximum deflection of the magnet shall not exceed 2 degrees.

7.5. *Humidity.* The instrument shall be operated under the conditions specified in 3.4.2 for a period of 10 hours after which it shall meet the requirements of 6.1.2.

(i) *Exceptions.* (*a*) Section 6.2.4 Dielectric Test. Last sentence: "The breakdown resistance shall not be less than 5 megohms at that voltage (A. C. or D. C. as applicable)."

(b) Section 7.5 Humidity. External filters may be used when necessary in the humidity test.

(2) *Application.* (i) Non-magnetic direction indicators complying with the specifications appearing in this order are hereby approved for all aircraft. Non-magnetic direction indicators already approved by the Administrator may continue to be installed in aircraft:

(*a*) For which an application for original type certificate is made prior to the effective date of this order.

(*b*) The prototype of which is flown within one year after the effective date of this order, and

(*c*) The prototype of which is not flown within one year after the effective date of this order if due to causes beyond the applicant's control.

(ii) If an alteration involving a change in type or model of non-magnetic direction indicator is made within nine months after the effective date of this order, previously approved types of non-magnetic direction indicators may be installed. However, in any such change made after the nine month period, new types of non-magnetic direction indicators installed in aircraft used in instrument flight shall meet the specifications contained in this section.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, each non-magnetic direction indicator shall be permanently marked with the Technical Standard Order designation, CAA–TSO–C5b, to identify the non-magnetic direction indicator as meeting the requirements of this order in accordance with the manufacturers' statement of conformance outlined in subparagraph (5) of this paragraph. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for non-magnetic direction indicators have been met.

(2) *Data requirements.* None.

(3) *Effective date.* After May 1, 1949, specifications contained in this order will constitute the basis for Civil Aeronautics Administration approval of non-magnetic direction indicators for use in certificated aircraft used in instrument flight.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Chief, Aircraft Division, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest Regional Office of the Civil Aeronautics Administration, Attention: Chief, Aircraft Division.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Division, Attention: W–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the non-magnetic direction indicator to be produced by him meets the minimum safety requirements established in this order. Immediately thereafter distribution of the non-magnetic direction indicator conforming with the terms of this order may be started and continued.

(ii) The prescribed identification on the non-magnetic direction indicator does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the non-magnetic direction indicator in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Office, Washington 25, D. C.

§ 514.6 *Technical Standard Order C6b: "Direction Indicator, Magnetic (Stabilized Type) (Stabilized Magnetic Compass)"*—(a) *Introduction.* Under section 6^1 of the Civil Aeronautics Act of 1938, as amended, and Parts 4a and 4b of this title, the Administrator of Civil Aeronautics is authorized to adopt standards for stabilized magnetic direction indicators intended for use in civil aircraft. In adopting these standards, consideration has been given to existing Government and industry standards for stabilized magnetic direction indicators.

(b) *Directive*—(1) *Provision.* The performance requirements for stabilized magnetic direction indicators, as set forth in sections 6 and 7 of SAE Specification AS–399, Direction Indicator, Magnetic (Stabilized Type) dated August 1, 1947,[1] stated below, with the exceptions noted in subdivision (i) of this subparagraph, are hereby established as minimum safety performance standards for stabilized magnetic direction indicators intended for use in civil aircraft:

1. *Purpose.* To specify minimum requirements for gyroscopically stabilized (or integrated) magnetic direction indicators for use in aircraft, the operation of which may subject the instrument to the environmental conditions specified in section 3.4.

2. *Scope.* This specification covers minimum requirements for gyroscopically stabilized (or integrated) magnetic direction indicators for use in aircraft.

3. *General requirements.*

3.1. *Material and workmanship.*

3.1.1. *Materials.* Materials shall be of a quality which experience and/or tests have demonstrated to be suitable and dependable for use in aircraft instruments.

3.1.2. *Workmanship.* Workmanship shall be consistent with high-grade aircraft instrument manufacturing practice.

3.2. *Radio interference.* The instrument shall not be the source of objectionable interference, under operating conditions at any frequencies used on aircraft, either by radiation or feed-back, in radio sets installed in the same aircraft as the instrument.

3.3. *Identification.* The following information shall be legibly and permanently marked on each unit or attached thereto:

(a) Name of instrument.
(b) S. A. E. Spec. AS 399.
(c) Rating (electrical, vacuum, etc.).
(d) Manufacturer's part number.
(e) Manufacturer's serial number or date of manufacture.
(f) Manufacturer's name and/or trademark.

3.4. *Environmental conditions.* The following conditions have been established as design criteria only. Tests shall be conducted as specified in sections 5, 6 and 7.

3.4.1. *Temperature.* When installed in accordance with the instrument manufacturer's instructions the unit shall function over the range of ambient temperatures shown in column A below and shall not be adversely affected by exposure to the temperatures shown in column B below:

Instrument location	A	B
Heated areas (temperature controlled)	−30° to 50° C.	−65° to 70° C.
Unheated areas (temperature uncontrolled)	−55° to 70° C.	−65° to 70° C.

3.4.2. *Humidity.* The instrument shall function and not be adversely affected when exposed to a relative humidity up to and including 95% at a temperature of approximately 32° C.

3.4.3. *Altitude.* The instrument shall function and not be adversely affected when subjected to a pressure and temperature range equivalent to −1,000 to +40,000 feet standard altitude, except as limited by application of section 3.4.1.

3.4.4. *Vibration.* When installed in accordance with the instrument manufacturer's instructions, the units shall function and shall not be adversely affected when subject to the following vibrations:

Type of instrument mounting	Cycles per minute [1]	Amplitude [1]	Maximum acceleration
		Inch	
Shock mounted panel instruments	500–3000	0.005	0.6 g
Unshock mounted panel instruments	500–3000	.010	1.3 g
Structure mounted instruments	500–3000	.030	3.8 g

[1] It is understood that the unit shall withstand vibration at higher frequencies, but the acceleration values need not exceed those shown above.

When specified by the purchaser for use in rotary wing aircraft, the frequency range shall be 150–3,000 cycles per minute.

4. *Detail requirements.*

4.1. *Indicating method.* One of the following methods of indication shall be employed:

Method I. Horizontal drum dial with fixed lubber's line. The graduations shall move to the right for right turns.

Method II. Rotating vertical dial with fixed lubber's line. Dial shall rotate counterclockwise for right turns.

Method III. Rotating pointer with fixed graduated dial. Pointer shall rotate clockwise for right turns. Dial position may be settable.

4.2. *Operating limits.* The instrument shall indicate magnetic heading throughout the 360 degree scale range, during dives, climbs or banks up to at least 60 degrees displacement from level flight.

4.3. *Dial markings.*

4.3.1. *Increments.* The indicators shall be provided with degree graduations at intervals not to exceed 5 degrees, with major graduations every 10 degrees and with numerals at intervals not greater than 30 degrees, except that the 0, 90, 180 and 270 degree positions shall be marked N, E, S and W respectively.

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West 39th St., New York, N. Y.

4.3.2. *Visibility.* Index and dial markings shall be visible from any point within the frustum of a cone the side of which makes an angle of 30 degrees with the perpendicular to the dial and the small diameter of which is the aperture of the instrument case. At least two numerals shall be simultaneously visible.

4.3.3. *Finish.* Unless otherwise specified, luminescent (self-activating) material shall be applied to major graduations, numerals and pointers.

4.4. *Power variation.* All units shall properly function with ±15% variation in D. C. voltage and/or ±10% variation in A. C. voltage and frequency, provided the A. C. voltage and frequency vary in the same direction.

4.5. *Compensation provisions.* Means shall if necessary, be provided for compensating for semi-circular deviation. Compensating effect shall not exceed 30 degrees in each direction for each axis when adjusted for maximum effect.

4.6. *Gyro caging provisions.* Unless the gyro assembly has unrestricted freedom of operation in the pitch and roll axes, means shall be provided for caging and/or releveling the gyro. Means shall be provided to indicate when the gyro is caged, except when it is not possible to leave the gyro in caged condition.

4.7. *Synchronizing provisions.* Automatic or manual means shall be provided to bring the indicated heading into alignment with the magnetic heading. If manual synchronization is required, an indication of alignment shall be provided.

4.8. *Power indication.* Means shall be provided to permit the operation of a device to indicate whether the instrument is receiving power.

5. *Test conditions.*

5.1. *Atmospheric conditions.* Unless otherwise specified, all tests required by this specification shall be made at an atmospheric pressure of approximately 29.92 inches of mercury and at an ambient temperature of approximately 22° C. When tests are made with the atmospheric pressure or the temperature substantially different from these values, allowance shall be made for the variation from the specified conditions.

5.2. *Vibration (to minimize friction).* Unless otherwise specified, all tests for performance may be made with the instrument subjected to a vibration of 0.002 to 0.005 inch amplitude at a frequency of 1,500 to 2,000 cycles per minute. The term amplitude as used herein indicates the total displacement from positive maximum to negative maximum.

5.3. *Power.* Unless otherwise specified, all tests for performance shall be conducted at a power rating recommended by the manufacturer.

5.4. *Magnetic field strength.* Unless otherwise specified, all tests required by this specification shall be made with a horizontal field strength of approximately 0.18 gauss and a vertical field strength of approximately 0.54 gauss, in the direction normal in the northern hemisphere. When tests are made with field strength values substantially different from these values, allowance shall be made for variations from the specified tolerances.

5.5. *Position.* Unless otherwise specified, all tests shall be made with indicators and transmitters in normal level position.

5.6 *Compensators.* Unless otherwise specified, all tests shall be made with magnetic compensators removed or adjusted to neutral position.

5.7. *Vibration stand.* For vibration tests a stand shall be used which will vibrate at any desired frequency between 500 and 3,000 cycles per minute and shall subject the instrument to vibration such that a point on the instrument case will describe, in a plane inclined 45 degrees to the horizontal plane, a circle, the diameter of which is equal to the amplitude specified herein.

6. *Individual performance requirements.* All instruments, or components of such, shall be subjected to whatever tests the manufacturer deems necessary to demonstrate specific compliance with this specification, including the following requirements where applicable.

6.1. *Starting.*

6.1.1. *Potential.* The gyro shall start to rotate and continue to run on application of 50 percent of rated suction for air operated instruments and 80 of rated voltage for electrically operated instruments.

6.1.2. *Operation interval.* Rated performance shall be obtained within 3 minutes after the application of rated power.

6.2. *Scale error.* When the magnetic-sensitive unit is placed on magnetic headings at 30 degree intervals, starting from North, the indicated headings shall correspond to actual magnetic headings within 4 degrees.

6.3. *Heeling.* When the instrument is tilted 10 degrees about the roll or pitch axis and rotated 360 degrees in azimuth in 30 degree increments, the indicated headings shall not differ from the indicated headings with the instrument in normal level position by more than 4 degrees. The instrument shall remain at each heading for 5 minutes before reading.

6.4. *Compensation.* With the instrument on N heading and the magnetic compensator adjusted for minimum effect, the scale error with compensator shall not differ from the scale error without compensator by more than 2 degrees. The range of adjustable compensation effect shall not exceed 30 degrees in each direction for each axis.

When the instrument is placed on any cardinal heading and the opposite axis compensator adjusted for maximum effect, the indicated heading shall not change more than 2 degrees.

6.5. *Dielectric.* The insulation shall be subjected to a dielectric test with an R. M. S. voltage at a commercial frequency applied for a period of five seconds equivalent to five times normal circuit operating voltage except where circuits include components for which such a test would be inappropriate the test voltage shall be 1.25 times normal circuit operating voltage. The insulation resistance shall not be less than 20 megohms at that voltage.

7. *Qualification tests.* As many instruments as deemed necessary to demonstrate that all instruments will comply with the requirements of this section shall be tested in accordance with the manufacturer's recommendations.

7.1. *Low temperature.* The instrument, or components, shall be subjected to the temperatures indicated in the following table in accordance with their location in the aircraft. After exposure to these temperatures for 5 hours, rated performance shall be obtained in 15 minutes after application of rated power using the magnetic field strength specified in section 5.4 except the field strength tolerance shall be ±20%.

Instrument location:	*Temperature*
Heated area (temperature controlled)	−30° C.
Unheated area (temperature uncontrolled)	−55° C.

7.2. *High temperature.* The requirements of section 7.1 shall apply except that the exposure temperatures shall be 50° C. for heated areas and 70° C. for unheated areas and rated performance shall be obtained in 3 minutes after application of rated power.

7.3. *Extreme temperature exposure.* The instrument, or components, shall, after alternate exposures to ambient temperatures of −65° C. and 70° C. for periods of 24 hours each and a delay of 3 hours at room temperature following completion of the exposure, meet the requirements of sections 6.1 and 6.2. There shall be no evidence of damage as a result of exposure to the extreme temperatures specified herein.

7.4. *Magnetic effect.* The magnetic effect of the indicator shall be determined in terms of the deflection of a free magnet, approximately 1½ inches long, in a magnetic field with a horizontal intensity of 0.18 (±0.01) gauss when the indicator is held in various positions on an east-west line with its nearest part 12 inches from the center of the magnet. This test shall first be made with the indicator not operating and then shall be repeated with the indicator in normal operation. The maximum deflection of the free magnet shall not exceed 5 degrees for any pointer or dial position.

7.5. *Humidity.* The instrument shall be operated under the extreme condition specified in section 3.4.2 for a period of 10 hours after which it shall meet the requirements of sections 6.1 and 6.2.

7.6. *Vibration.* The instrument(s) shall be subjected, while in normal operation, to vibration with an amplitude of 0.010 inch at frequencies from 1,000 to 3,000 cycles per minute in order to determine whether the natural frequency of the instrument(s) is in this frequency range. While the instrument is being vibrated, the maximum range of the indicator dial (or pointer) oscillation shall not exceed 3 degrees and the maximum difference in mean indicated heading with and without vibration shall not exceed 2 degrees. After 3 hours exposure to vibration amplitudes as specified in section 3.4.4 and at the natural frequency of between 1,000 and 3,000 c. p. m., otherwise at 2,000 c. p. m., the instrument(s) shall meet the requirements of section 6.1, 6.2 and 6.3. Those components normally intended for shock mounting shall be subjected to a vibration having only 0.005 inch amplitude. No damage shall be evident after this test.

7.7. *Field strength variation.* With transmitter at a total field of 0.57±0.02 gauss at a dip angle of 72 degrees ±1 degree and the compass at a null, the null shall not vary more than ±2 degrees when the dip angle is changed to 80 degrees ±1 degree.

7.8. *Turn error.* The scale error resulting from a coordinated turn of 180 degrees in one minute at a true air speed of 180 miles per hour shall be within 2 degrees 2 minutes after resumption of straight and level flight. The error shall have been obtained from a turn which was begun from an easterly heading.

(i) *Exceptions.* (*a*) Section 6.5 Dielectric Test. Last sentence: "The breakdown resistance shall not be less than 5 megohms at that voltage (A. C. or D. C. as applicable)."

(2) *Application.* (i) Stabilized magnetic direction indicators complying with the specifications appearing in this order are hereby approved for all aircraft. Stabilized magnetic direction indicators already approved by the Administrator may continue to be installed in aircraft:

(*a*) For which an application for original type certificate is made prior to the effective date of this order,

(*b*) The prototype of which is flown within one year after the effective date of this order, and

(*c*) The prototype of which is not flown within one year after the effective date of this order if due to causes beyond the applicant's control.

(ii) If an alteration involving a change in type or model of stabilized magnetic direction indicator is made within nine months after the effective date of this order, previously approved types of stabilized magnetic direction indicators may be installed. However, in any such change made after the nine

month period, new types of stabilized magnetic direction indicators installed in aircraft used in instrument flight shall meet the specifications contained in this section.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, each stabilized magnetic direction indicator shall be permanently marked with the Technical Standard Order designation, CAA–TSO–C6b, to identify the stabilized magnetic direction indicator as meeting the requirements of this order in accordance with the manufacturers' statement of conformance outlined in subparagraph (5) of this paragraph. This identification will be accepted by the Civil Aeronautics Administration as evidenced that the established minimum safety requirements for stabilized magnetic direction indicators have been met.

(2) *Data requirements.* None.

(3) *Effective date.* After May 1, 1949, specifications contained in this order will constitute the basis for Civil Aeronautics Administration approval of stabilized magnetic direction indicators for use in certificated aircraft used in instrument flight.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Chief, Aircraft Division, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest Regional Office of the Civil Aeronautics Administration, Attention: Chief, Aircraft Division.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Division, Attention: W–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the stabilized magnetic direction indicator to be produced by him meets the minimum safety requirements established in this order. Immediately thereafter distribution of the stabilized magnetic direction indicator conforming with the terms of this order may be started and continued.

(ii) The prescribed identification on the stabilized magnetic direction indicator does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the stabilized magnetic direction indicator in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Office, Washington 25, D. C.

§ 514.7 *Technical Standard Order C7b: "Direction Indicator, Magnetic, Non-Stabilized Type (Magnetic Compass)"*—(a) *Introduction.* (1) Under section 601 of the Civil Aeronautics Act of 1938, as amended, and Parts 3, 4a, 4b, and 6 of this title issued pursuant thereto, the Administrator of Civil Aeronautics is authorized to adopt standards for non-stabilized magnetic direction indicators intended for use in civil aircraft. In adopting these standards, consideration has been given to existing Government and industry standards for non-stabilized magnetic direction indicators.

(b) *Directive*—(1) *Provision*—(i) *Requirements established.* The requirements for non-stabilized magnetic direction indicators, as set forth in SAE Specification AS–398 Direction Indicator Magnetic, Non-Stabilized Type, dated July 1, 1947 [1] (13 F. R. 3852, 7731) with the exceptions noted in subdivisions (ii) and (iii) of this subparagraph, are hereby established as minimum safety standards for non-stabilized magnetic direction indicators intended for use in civil aircraft.

(ii) *Exceptions.* Section 4.5, "Means shall be provided for compensating for semi-circular deviation. Compensating effect shall be between 15 and 40 degrees in each direction for each axis when adjusted for maximum effect."

(iii) Section 6.7, second sentence, line 4—"The maximum adjustable compensation effect shall be between 15 and 40 degrees in each direction for each axis."

(2) *Application.* (i) Non-stabilized magnetic direction indicators complying with the specifications appearing in this section are hereby approved for all aircraft. Non-stabilized magnetic direction indicators already approved by the Administrator may continue to be installed in aircraft:

(*a*) For which an application for original type certificate is made prior to the effective date of this section,

(*b*) The prototype of which is flown within one year after the effective date of this section, and

(*c*) The prototype of which is not flown within one year after the effective date of this section if due to causes beyond the applicant's control.

If an alteration or replacement involving a change in type or model of non-stabilized magnetic direction indicators is made within nine months after the effective date of this section, previously approved types of non-stabilized magnetic direction indicators may be installed. However, in any such change made after the nine month period, new types of non-stabilized magnetic direction indicators installed in aircraft used in instrument flight shall meet the specifications contained herein.

(c) *Specific instructions*—(1) *Marking.* (i) In addition to the identification information required in the referenced specification, each non-stabilized magnetic direction indicator shall be permanently marked with the Technical Standard Order designation, CAA–TSO–C7b, to identify the non-stabilized magnetic direction indicators as meeting the requirements of this section in accordance with the manufacturers' statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for non-stabilized magnetic direction indicators have been met.

(2) *Data requirements.* (i) None.

(3) *Effective date.* (i) After July 1, 1948, specifications contained in this section will constitute the basis for Civil Aeronautics Administration approval of non-stabilized magnetic direction indicators for use in certificated aircraft used in instrument flight.

(4) *Deviations.* (i) Requests for deviation from, or waiver of, the requirements of this section, which affect the basic airworthiness of the component, should be submitted for approval by the Chief, Aircraft Division, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest Regional Office of the Civil Aeronautics Administration, Attention: Superintendent, Aircraft Branch.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration Aircraft Division. Attention: W–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the non-stabilized magnetic direction indicators to be produced by him meet the minimum safety requirements established in this section. Immediately thereafter distribution of the non-stabilized magnetic direction indicators conforming with the terms of this section may be started and continued.

(ii) The prescribed identification on the non-stabilized magnetic direction indicators does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the non-stabilized magnetic direction indicators in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this section are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Office, Washington 25, D. C.

§ 514.8 *Technical Standard Order C8a: "Climb Indicator, Pressure Actuated (Vertical Speed Indicator)"*—(a) *Introduction.* (1) Climb indicators are in the class of aircraft components which the Administrator of Civil Aeronautics is authorized to approve in accordance with Parts 3, 4a, 4b, and 6 of this title.

(2) This Technical Standard Order is intended to serve as a criterion by which the product manufacturer can obtain Civil Aeronautics Administration approval of his climb indicator.

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West 39th St., New York, N. Y.

(3) In the establishment of this Technical Standard Order, consideration has been given to existing Government and industry standards for climb indicators for the purpose of adopting the performance requirements of one of the recognized aeronautical standards as the minimum safety requirements for climb indicators which are intended for use in civil aircraft. The specification of the Society of Automotive Engineers for climb indicators contains such requirements.

(b) *Directive*—(1) *Provision.* Pursuant to Parts 3, 4a, 4b, and 6 of this title, which authorize the Administrator to approve aircraft equipment, the performance requirements for climb indicators as set forth in SAE Specification AS–394, Climb Indicator, dated August 1, 1947,[1] stated below, are hereby established as minimum safety requirements for climb indicators which are intended for use in civil aircraft:

1. *Purpose.* To specify minimum requirements for pressure actuated climb indicators for use in aircraft, the operation of which may subject the instrument to environmental conditions specified in section 3.4.

2. *Scope.* This specification covers three types as follows:

Type I. Range 0–2,000 feet per minute climb and descent.

Type II. Range 0–4,000 feet per minute climb and descent.

Type III. Range 0–6,000 feet per minute climb and descent.

3. *General requirements.*

3.1. *Materials and workmanship.*

3.1.1. *Materials.* Materials shall be of a quality which experience or tests have demonstrated to be suitable and dependable for use in aircraft instruments.

3.1.2. *Workmanship.* Workmanship shall be consistent with high-grade aircraft instrument manufacturing practice.

3.2. *Identification.* The following information shall be legibly and permanently marked on the units or attached thereto:

(a) Name of instrument.

(b) SAE Spec. 394.

(c) Manufacturer's part number.

(d) Manufacturer's serial number or date of manufacture.

(e) Manufacturer's name and/or trademark.

3.3. *Environmental conditions.* The following conditions have been established as design criteria only. Tests shall be conducted as specified in sections 5, 6, and 7.

3.3.1. *Temperature.* When the instruments are mounted in accordance with manufacturer's instructions, they shall function over the range of ambient temperatures of −30° C. to 50° C. and shall not be adversely affected by exposure to temperatures of −65° C. to 70° C.

3.3.2. *Humidity.* The units shall function and not be adversely affected when exposed to a relative humidity up to and including 95 percent at approximately 32° C.

3.3.3. *Vibration.* When the instruments are mounted in accordance with manufacturer's instructions, they shall function and shall not be adversely affected when subjected to the following vibration.

Frequency: 500–3,000 cycles per minute.

Amplitude: 0.010 inch.

Maximum acceleration 0.8 g.

NOTE: It is understood that the units shall withstand vibration at higher frequencies but the acceleration values need not exceed that shown above.

When specified by the purchaser for use in rotary wing aircraft, the frequency range shall be 150–3,000 cycles per minute.

3.3.4. *Altitude.* The units shall function and not be adversely affected when subjected to a pressure and temperature range equivalent to an altitude range of −1,000 feet to +50,000 feet except that the instrument temperature shall not be lower than −30° C.

4. *General requirements.*

4.1. *Indicating method.* Ascent shall be indicated by a clockwise rotation of the pointer from the zero at the 9 o'clock position. Descent shall be indicated by a counterclockwise rotation. Stops shall be incorporated to limit the pointer movement to not more than 178 degrees in each direction from zero.

4.2. *Dial markings.*

4.2.1. *Increments.* Markings may be provided as follows:

Type I. Markings at 100 ft/min intervals with major graduations at 500 ft/min intervals.

Types II and III. Markings at 100 ft/min intervals up to 2,000 ft/min with major graduations at 500 ft/min intervals.

4.2.2. *Finish.* Unless otherwise specified, luminescent material (self-activating) shall be applied to the pointer, major graduations and numerals.

4.2.3. *Name.* Instrument name or function it measures may be legibly indicated in the same finish as applied to the major graduations and numerals.

4.2.4. *Visibility.* Pointer and dial markings shall be visible from any point within the frustrum of a cone, the side of which makes an angle of 30 degrees with the perpendicular to the dial and the small diameter of which is the aperture of the instrument case. The distance between the dial and the cover glass shall be a practical minimum and shall not exceed 0.187 of an inch.

4.3. *Zero setting system.* If means for manually setting the pointer at zero is provided, it shall not be accessible in flight.

5. *Test conditions.*

5.1. *Atmospheric conditions.* Unless otherwise specified, all tests required by this specification shall be made at an atmospheric pressure of approximately 29.92 inches of mercury and at a temperature of approximately 22° C. When tests are made with the atmospheric pressure or the temperature substantially different from these values, allowance shall be made for the variation from the specified condition.

5.2. *Vibration (to minimize friction).* Unless otherwise specified, all tests for performance may be made with the instrument subjected to a vibration of 0.002 to 0.005 inch amplitude at a frequency of 1,500 to 2,000 cycles per minute. The term amplitude as used herein indicates the total displacement from positive maximum to negative maximum.

5.3. *Vibration stand.* A vibration stand shall be used which will vibrate at any desired frequency between 500 and 3,000 cycles per minute and shall subject the instrument to vibration such that a point on the instrument case will describe, in a plane inclined 45 degrees to the horizontal, a circle, the diameter of which is equal to the amplitude specified herein.

6. *Individual performance requirements.* All instruments shall be subjected to whatever tests the manufacturer deems necessary to demonstrate specific compliance with this specification including the following requirements where applicable.

6.1. *Zero setting range.* The range of movement of the pointer by means of the zero adjustment shall not be less than 400 feet per minute for the "Up" and "Down" position.

6.2. *Calibration.* When subjected to the rates of change of pressure indicated in Table I for the altitude intervals shown, the errors shall not exceed the tolerances specified.

6.3. *Leak.* A suction of 15 inches of mercury and a pressure of 10 inches of mercury shall not change by more than 0.1 inch of mercury in 10 seconds at each condition.

6.4. *Position error.* The change in pointer indication with change in instrument position shall not exceed 50 feet per minute.

7. *Qualification tests.* As many instruments as deemed necessary, to demonstrate that all instruments will comply with the requirements of this section, shall be tested in accordance with the manufacturers' recommendations.

7.1. *Low temperature.* The instrument shall be exposed to a temperature of −30° C. for 3 hours and while at this temperature shall be subjected to the rates of change of pressure indicated in Table II for the altitude intervals shown. The errors shall not exceed the tolerances specified in Table II.

7.2. *Extreme temperature exposure.* The instrument shall, after alternate exposures to ambient temperatures of −65° C. and +70° C. for periods of 24 hours each and delay of 3 hours at room temperature following completion of the exposure, meet the requirements of sections 6.2 and 6.3. There shall be no evidence of damage as a result of exposure to the extreme temperatures specified herein.

7.3. *Vibration.* The instrument shall be vibrated at 500 cycles per minute so that a point on the case will describe a circle of 0.003–0.005 inch diameter. The frequency shall be slowly increased to 3,000 cycles per minute and then slowly decreased to 500 cycles per minute, to determine whether the natural frequency of the instrument is in this range. The drift of the pointer shall not exceed 50 feet per minute and it shall not oscillate more than 50 feet per minute. After three hours exposure to the vibration amplitude specified in section 3.3.3 and at the natural frequency (if between 500 and 3,000 cycles per minute) or at 2,000 cycles per minute the instrument shall meet the requirements of section 6. No damage shall be evident after this test.

7.4. *Lag.* The natural lag of the instrument when checked between the following points shall be between 6 and 15 seconds.

Type I. 1,800—200 feet per minute.

Types II and III. 2,000—200 feet per minute.

7.5 *Overpressure.* After subjecting the instrument to rates of 20,000 feet per minute climb and 30,000 feet per minute descent, the pointer shall return to its original indication within 100 feet per minute.

TABLE 1—CALIBRATION (REFERENCE SECTION 6)

TYPE I (RANGE 0–2,000 FEET PER MINUTE)

Standard altitude test interval (feet)	Test point ascent and descent (feet per minute)	Tolerance (feet per minute)
Between 2,000 and 4,000	500	35
	1,000	75
	1,500	150
Between 15,000 and 17,000	1,500	200
Between 28,000 and 30,000	1,500	200

TYPES II AND III (RANGES 0–4,000 AND 0–6,000 FEET PER MINUTE)

Between 2,000 and 4,000	500	100
	1,000	200
	2,000	300
	3,000	[1] 300
	4,000	400
	5,000	500
Between 15,000 and 17,000	2,000	[1] 300
	4,000	400
Between 28,000 and 30,000	2,000	[1] 300
	4,000	400

[1] Maximum test point for Type II.

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West Thirty-ninth Street, New York, N. Y.

TABLE 2—LOW TEMPERATURE (REFERENCE SECTION 7.1)

TYPE I (RANGE 0–2,000 FEET PER MINUTE)

Standard altitude test interval (feet)	Test point ascent and descent (feet per minute)	Tolerance (feet per minute)
Between 2,000 and 4,000	1,500	200
Between 28,000 and 30,000	1,500	250

TYPES II–III (RANGE 0–4,000 AND 0–6,000 FEET PER MINUTE)

Between 2,000 and 4,000	2,000	[2]300
	4,000	400
Between 28,000 and 30,000	2,000	[2]300
	4,000	400

[2] Test point for Type II.

7.6. *Magnetic effect.* The magnetic effect of the instrument shall be determined in terms of the deflection of a free magnet, approximately 1½ inches long, in a magnetic field with a horizontal intensity of 0.18 ±0.01 gauss, when the indicator is held in various positions on an east-west line with its nearest part five inches from the center of the magnet. (An aircraft compass with the compensating magnets removed therefrom may be used as the free magnet for this test.) The maximum deflection of the magnet shall not exceed one degree for any pointer deflection.

7.7. *Humidity.* After being subjected to the extreme conditions of section 3.3.2 for 10 hours, the instrument shall meet the requirements of section 6.

(2) *Application.* (i) Climb indicators complying with the specifications appearing in this Technical Standard Order are hereby approved for all aircraft. Climb indicators already approved by the Administrator may continue to be installed in aircraft

(*a*) For which an application for original type certificate is made prior to the effective date of this order,

(*b*) The prototype of which is flown within 1 year after the effective date of this order, and

(*c*) The prototype of which is not flown within 1 year after the effective date of this order if due to causes beyond the applicant's control.

(ii) If a major change is made in the installation within 9 months after the effective date of this order involving a change in type or model of climb indicator, previously approved types of climb indicators may be installed. However, in any such change made after the 9-month period, new types of climb indicators installed in aircraft used in instrument flight shall meet the specifications contained herein.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, each climb indicator shall be permanently marked with the Technical Standard Order designation "CAA–TSO–C8" to identify the climb indicator as meeting the requirements of this order in accordance with the manufacturer's statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for climb indicators have been met.

(2) *Data requirements.* None.

(3) *Effective date.* After July 1, 1948, specifications contained in this Technical Standard Order will constitute the basis for Civil Aeronautics Administration approval of climb indicators for use in certificated aircraft used in instrument flight.

(4) *Deviations.* Requests for deviation from or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Director, Aircraft and Components Service, Office of Safety Regulation, Civil Aeronautics Administration. These requests should be addressed to the nearest regional office of the Civil Aeronautics Administration, Attn: Superintendent, Aircraft and Components Branch.

(5) *Conformance.* (i) The manufacturer shall furnish to the CAA, Aircraft and Components Service, A–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the climb indicator to be produced by him meets the minimum safety requirements established in this order. Immediately thereafter distribution of the climb indicator conforming with the terms of this order may be started and continued.

(ii) The prescribed identification on the climb indicator does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the climb indicator in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Staff, Washington 25, D. C.

§ 514.9 *Technical Standard Order C9a: "Automatic Pilot"*—(a) *Introduction.* (1) Automatic pilots are in the class of aircraft components which the Administrator of Civil Aeronautics is authorized to approve in accordance with Parts 3, 4a, 4b, 6, and 15 of this title.

(2) This Technical Standard Order is intended to serve as a criterion by which the product manufacturer can obtain Civil Aeronautics Administration approval of his automatic pilot.

(3) In the establishment of this Technical Standard Order, consideration has been given to existing Government and industry standards for automatic pilots for the purpose of adopting the performance requirements of one of the recognized aeronautical standards as the minimum safety requirements for automatic pilots which are intended for use in civil aircraft. The specification of the Society of Automotive Engineers for automatic pilots contains such requirements.

(b) *Directive*—(1) *Provision.* Pursuant to Parts 3, 4a, 4b, 6, and 15 of this title, which authorize the Administrator to approve aircraft equipment, the performance requirements for automatic pilots as set forth in SAE Specification AS–402, Automatic Pilot, dated August 1, 1947,[1] stated below, are hereby established as minimum safety requirements for automatic pilots which are intended for use in civil aircraft:

1. *Purpose.* To specify minimum requirements for automatic pilots for use in aircraft, the operation of which may subject the instruments to the environmental conditions specified in section 3.4.

2. *Scope.* This specification covers all gyroscopic and servo control types of automatic pilots intended for use on aircraft to operate automatically the control surfaces of the aircraft to maintain a stabilized flight attitude with respect to the longitudinal, lateral and vertical axes, and to provide for maneuvering the airplane through servo control.

3. *General requirements.*

3.1. *Material and workmanship.*

3.1.1. *Materials.* Materials shall be of a quality which experience and/or tests have demonstrated to be suitable and dependable for aircraft instruments.

3.1.2. *Workmanship.* Workmanship shall be consistent with high grade aircraft instrument manufacturing practice.

3.2. *Radio interference.* The instrument shall not be the source of objectionable interference under operating conditions at any frequencies used on aircraft, either by radiation or feedback, in radio sets installed in the same aircraft as the instrument.

3.3. *Identification.* The following information shall be legibly and permanently marked on each of the major components or attached thereto.

(a) Name of the unit and type of automatic pilot.

(b) SAE Spec. AS 402.

(c) Rating (electrical or vacuum power supply and maximum servo output where applicable).

(d) Manufacturer's part number.

(e) Manufacturer's serial number or date of manufacture.

(f) Manufacturer's name and/or trademark.

3.4. *Environmental conditions.* The following conditions have been established as design criteria only. Tests shall be conducted as specified in sections 5, 6, and 7.

3.4.1. *Temperature.* When located in accordance with the instrument manufacturer's instruction, the units shall function over the range of ambient temperatures as listed in column A below and shall not be adversely affected by exposure to the temperature shown in column B below:

Instrument location	A	B
Power plant accessory compartment	−30° to 130° C.	−65° to 130° C.
Heated areas (temperature controlled)	−30° to 50° C.	−65° to 70° C.
Unheated areas (temperature uncontrolled)	−55° to 70° C.	−65° to 70° C.

3.4.2. *Humidity.* All units shall function and not be adversely affected when exposed to a relative humidity up to and including 95 percent at a temperature of approximately 32° C.

3.4.3. *Altitude.* All units shall function and not be adversely affected when exposed to a pressure and temperature range equiva-

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West Thirty-ninth Street, New York, N. Y.

lent to −1,000 feet to 40,000 feet standard altitude, except as limited by application of section 3.4.1.

3.4.4. *Vibration.* When installed in accordance with instrument manufacturer's instructions, all units shall function and shall not be adversely affected when subjected to vibrations having characteristics likely to be encountered at the locations in the aircraft where the units are to be installed.

4. *Detail requirements.*

4.1. *Instrumentation.*

4.1.1. *Direction indication.* If aircraft direction indication is provided it shall be in accordance with AS 397 or AS 399.

4.1.2. *Bank and pitch indication.* If aircraft bank and/or pitch indication is provided it shall be in accordance with AS 396.

4.1.3. *Servo signal indication.* Means shall be provided to clearly indicate the magnitude and direction of servo signal present, except where automatic synchronization is provided. Then, yaw and roll signal need not be indicated. With the automatic pilot engaged, the pitch axis indication shall be representative of control surface load.

4.1.4. *Engagement indication.* Means shall be provided to clearly indicate whether the automatic pilot servos are in the engaged or disengaged position.

4.1.5. *System power indication.* Means shall be provided to permit operation of a device to indicate whether or not the instrument is receiving power.

4.1.6. *Servo power indication.* Means shall be provided to indicate when the servos are engaged but are not energized if such condition is possible.

4.1.7. *Caging indication.* Means shall be provided to indicate when the gyros are caged, except where it is not possible to leave them in a caged conditon.

4.1.8. *Interlock indication.* The operation of any protective interlock device which renders any part of the system inoperative shall be indicated.

4.2. *Control range.*

4.2.1. *Corrective control.* The automatic pilot shall give stabilized control about the three axes throughout the following minimum ranges:

(a) Pitch ±50°.
(b) Roll ±75°.
(c) Yaw ±20°.

4.2.2. *Command control.* Means shall be provided to limit maneuvering the airplane, through the automatic pilot controls, to the following maximum ranges:

(a) Pitch ±30°.
(b) Bank ±45°.
(c) Turn=unlimited angle to the right or left.

4.3. *On-off control.* Means shall be provided, either electrical or mechanical, to permit the automatic pilot to be put in operation and to remove it from operation.

4.4. *Safety provisions.*

4.4.1. *Servo force.* Means shall be provided to limit the servo force to a safe value as determined in specific applications. The mounting base and housing of the servos shall be designed to withstand a load of 1.5 times the maximum output of the servo applied in a manner similar to that found in actual installation.

4.4.2. *Interlock provisions.* A means shall be provided to prevent the servo system from becoming operative until the automatic pilot is ready for operation.

4.4.3. *Indicator power source.* When the pitch and bank and/or azimuth units furnish an indicating reference, either directly or by repeaters, the automatic pilot shall be so designed that they become operative simultaneously with the turning on of the aircraft power source.

4.4.4. *Special features.* When special features are incorporated in the design of the automatic pilot (either integral or as accessories) they shall provide adequate interlocks, electrical and/or mechanical to prevent improper operation. For example:

(a) Coordinated turn control. Bank shall be limited.

(b) Altitude control. Pitch attitude correction shall be limited.

(c) Glide path control. Pitch attitude correction shall be limited.

4.4.5. *Servo disengaging means.* A positive mechanical means, independent of the aircraft power supply, shall be provided to disengage the servos from the aircraft control system. When the servos are disengaged, the manual control of the aircraft shall not be objectionably affected.

4.4.6. *Emergency release.* Means shall be provided for releasing the automatic control. The actuating device shall be suitable for mounting on the control wheel.

4.4.7. *Reliability.* Insofar as practicable, without affecting its normal operation, the automatic pilot design shall be such that should a failure occur in the system, no signal shall occur which would apply hazardous control to the airplane.

4.5. *Stability.* The roll pitch and yaw signal sources shall establish the three axes about which the airplane is automatically controlled. The automatic pilot shall provide flight attitude stabilization, in smooth air, within 1 degree of selected attitude and heading about the above reference axes.

4.6. *Powr variations.* All units shall properly function with a voltage and frequency variation of ±10% of the rated value (provided the A. C. voltage and frequency vary in the same direction), and/or ±30% of the rated vacuum or hydraulic pressure. Power variations beyond these limits shall not cause adverse control.

5. *Test Conditions.*

5.1. *Atmospheric conditions.* Unless otherwise specified, the tests shall be accomplished at atmospheric pressure of approximately 29.92 inches of mercury and at an ambient temperature of approximately 22° C. When tests are made with atmospheric pressure or temperature substantially different from these values, allowance shall be made for the difference from the specified conditions.

5.2. *Vibration (to minimize friction).* Unless otherwise specified, all tests for performance may be made with the instrument subjected to a vibration of 0.002 to 0.005 inch amplitude at a frequency of 1,500 to 2,000 cycles per minute. The term amplitude as used herein indicates the total displacement from positive maximum to negative maximum.

5.3. *Power conditions.* Unless otherwise specified all tests for performance shall be conducted at the power rating recommended by the manufacturer.

5.4. *Vibration stand.* A vibration stand shall be used which will vibrate at any desired frequency between 500 and 3,000 cycles per minute and shall subject the instrument to vibration such that a point on the instrument case will describe in a plane inclined 45 degrees to the horizontal plane, a circle, the diameter of which is equal to the amplitude specified therein.

6. *Individual performance tests.* All of the various units or complete system shall be tested in accordance with the manufacturer's recommendations. The manufacturer shall conduct sufficient tests to prove compliance with this specification, including the following requirements where applicable.

6.1. *Dielectric.* Insulation shall be subjected to a dielectric test with a R. M. S. voltage at a commercial frequency applied for a period of five seconds equivalent to five times normal circuit operating voltage except where circuits include condensers or other components for which such a test would be inappropriate; then the test voltage shall be 1.25 times circuit operating voltage. The insulation resistance shall not be less than 20 megohms at that voltage.

7. *Qualification tests.* As many instruments or components as deemed necessary to demonstrate that all instruments will comply with the requirements of this section shall be tested in accordance with the manufacturer's recommendations.

7.1. *Low temperature operation.* Each component, or the complete system, after having been subjected to an ambient temperature of −30° C. or −55° C. as applicable (see par. 3.4.1) for a period of 5 hours, without operating, shall then meet the requirements of section 6 at that temperature.

7.2. *High temperature.* The requirements of section 7.1 shall apply except that the exposure temperature shall be 50° C., 70° C., or 130° C. as applicable (see par. 3.4.1).

7.3. *Extreme temperature exposure.* The instrument or components shall, after alternate exposures to ambient temperatures of −65° C. and 70° C. or −65° C. and 130° C. as applicable (see par. 3.4.1) for periods of 24 hours each and a delay of 3 hours following completion of the exposure, meet the requirements of section 6 at room temperature. There shall be no evidence of damage as a result of exposure to the extreme temperature specified herein.

7.4. *Magnetic effect.* Magnetic effect of the controller and all indicators shall be determined in terms of the deflection of a free magnet approximately 1½ inches long, in a magnetic field with a horizontal intensity of 0.18 (±.01) gauss when the units are held in various positions on an east-west line 12 inches from the center of the magnet. The maximum deflection of the magnet shall not exceed five degrees. Tests shall be made with instruments in power-on condition.

7.5. *Humidity.* The instrument shall be operated under the extreme condition specified in section 3.4.2 for a period of 10 hours after which it shall meet the requirements of section 6.

7.6. *Vibration.* The components shall be subjected to vibration with amplitudes of 0.005" to 0.063" as specified by the manufacturer at frequencies from 1,000 to 3,000 cycles per minute in order to determine that the natural frequency of the components does not lie in this frequency range. After three hours exposure to a vibration test recommended by the manufacturer, as per section 3.4.4, the instrument shall meet the requirements of section 6.

(2) *Application.* (i) Automatic pilots complying with the specifications appearing in this Technical Standard Order are hereby approved for all aircraft. Automatic pilots already approved by the Administrator may continue to be installed in aircraft:

(*a*) For which an application for original type certificate is made prior to the effective date of this order,

(*b*) The prototype of which is flown within 1 year after the effective date of this order, and

(*c*) The prototype of which is not flown within 1 year after the effective date of this order if due to causes beyond the applicant's control.

(ii) If a major change is made in the installation within 9 months after the effective date of this order involving a change in type or model of automatic pilot, previously approved types of automatic pilots may be installed. However, in any such change made after the 9-month period new type of automatic pilots installed in aircraft used in instrument flight shall meet the specifications contained in this section.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification

information required in the referenced specification, each automatic pilot shall be permanently marked with the Technical Standard Order designation "CAA–TSO–C9" to identify the automatic pilot as meeting the requirements of this order in accordance with the manufacturer's statement of conformance outlined in subparagraph (5) of this paragraph. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for automatic pilots have been met.

(2) *Data requirements.* None.

(3) *Effective date.* After July 1, 1948, specifications contained in this Technical Standard Order will constitute the basis for Civil Aeronautics Administration approval of automatic pilots for use in certificated aircraft used in instrument flight.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Director, Aircraft and Components Service, Office of Safety Regulation, Civil Aeronautics Administration. These requests should be addressed to the nearest regional office of the Civil Aeronautics Administration, Attn: Superintendent, Aircraft and Components Branch.

(5) *Conformance.* (i) The manufacturer shall furnish to the CAA, Aircraft and Components Service, A–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the automatic pilot to be produced by him meets the minimum safety requirements established in this order. Immediately thereafter distribution of the automatic pilot conforming with the terms of this order may be started and continued.

(ii) The prescribed identification on the automatic pilot does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the automatic pilot in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Staff, Washington 25, D. C.

§ 514.10 *Technical Standard Order C10a: "Altimeter, Pressure Actuated, Sensitive Type"*—(a) *Introduction.* Under section 601 of the Civil Aeronautics Act of 1938, as amended, and Parts 3, 4a, 4b, and 6 of this title, the Administrator of Civil Aeronautics is authorized to adopt standards for sensitive altimeters intended for use in civil aircraft. In adopting these standards, consideration has been given to existing Government and industry standards for sensitive altimeters.

(b) *Directive*—(1) *Provision.* The performance requirements for sensitive altimeters, as set forth in sections 6 and 7 of SAE Specification AS–392A, Altimeters, Pressure Actuated, Sensitive Type revised February 1, 1949,[1] stated below, are hereby established as minimum safety performance standards for sensitive altimeters intended for use in civil aircraft:

1. *Purpose.* To specify minimum requirements for Pressure Actuated Sensitive Altimeters for use in aircraft, the operation of which may subject the instrument to the environmental conditions specified in section 3.3.

2. *Scope.* This Aeronautical Standard covers two basic types of instruments as follows:

Type I: Range 35,000 feet. Barometric pressure. Scale range at least 28.1–30.99 inches of mercury (946–1,049 millibars). May include markers working in conjunction with the barometric pressure scale to indicate pressure-altitude.

Type II: Range 50,000 feet. Barometric pressure. Scale range at least 28.1–30.99 inches of mercury (946–1,049 millibars). May include markers working in conjunction with the barometric pressure scale to indicate pressure-altitude.

3. *General requirements.*

3.1 *Materials and workmanship.*

3.1.1 *Materials.* Materials shall be of a quality which experience and/or tests have demonstrated to be suitable and dependable for use in aircraft instruments.

3.1.2 *Workmanship.* Workmanship shall be consistent with high-grade aircraft instrument manufacturing practice.

3.2 *Identification.* The following information shall be legibly and permanently marked on the units or attached thereto:

a. Name of instrument (altimeter).
b. SAE Specification AS 392A.
c. Manufacturer's part No.
d. Manufacturer's Serial No. or date of manufacture.
e. Manufacturer's name and/or trade mark.

3.3 *Environmental conditions.* The following conditions have been established as design requirements only. Tests shall be conducted as specified in sections 5, 6, 7.

3.3.1 *Temperature.* When installed in accordance with the instrument manufacturer's instructions, the instrument shall function over the range of ambient temperature of −30° C. to 50° C. and shall not be adversely affected by exposure to temperatures of −65° C. to 50° C.

3.3.2 *Humidity.* The units shall function and shall not be adversely affected when exposed to any relative humidity in the range from 0 to 95 percent at a temperature of approximately 32° C.

3.3.3 *Vibration.* When installed in accordance with the manufacturer's instructions, the units shall function and shall not be adversely affected when subjected to the following vibration.

Frequency: 500–3,000 cycles per minute.
Amplitude: 0.010 inch.
Maximum acceleration: 0.8 g.

NOTE: It is understood that the unit shall withstand vibration at higher frequencies but the acceleration value need not exceed that shown above.

When specified by the purchaser for use in rotary wing aircraft, the frequency range shall be 150–3,000 cycles per minute.

3.3.4 *Overpressure.* The units shall not be adversely affected by exposure to a pressure of 50 inches of mercury absolute.

3.4 *Magnetic effect.* The magnetic effect of the indicator shall not adversely affect the operation of the instruments installed in the same aircraft.

4. *Detail requirements.*

4.1 *Indicating method.* The following method of indication shall be employed. For indicating an ascent in altitude the sensitive pointer shall move in a clockwise direction completing one revolution (360°) for each 1,000 feet of altitude change. A means shall be provided for showing the multiples of 1,000 feet.

4.2 *Dial markings.*

4.2.1 *Increments.* Markings shall be provided at intervals not exceeding 20 feet of altitude with major increment markings at 100-foot intervals.

4.2.2 *Zero setting system.* A zero setting system shall be provided which will permit the altimeter to be set to show field elevation at any existing ground level barometric pressure. The zero setting system shall show the barometric pressure in inches of mercury or millibars at sea level throughout the range of at least 28.1 to 30.99 inches (946 to 1,049 millibars). A safety feature shall be provided which will prevent incorrect reading of the pressure scale when the zero setting mechanism exceeds its barometric pressure limits.

4.2.3 *Finish.* Unless otherwise specified, luminescent material (self-activating) shall be applied to the pointer(s), major graduations and numerals.

4.2.4 *Name.* The word "altitude" shall be marked on the dial and may be in the same finish as the numerals.

4.3 *Visibility.* Pointers and dial markings shall be visible from any point within the frustrum of a cone, the side of which makes an angle of 30° with the perpendicular to the dial and the small diameter of which is the aperture of the instrument case. The distance between the dial and the cover glass shall be a practical minimum and shall not exceed 0.25 of an inch.

5. *Test conditions.*

5.1 *Atmospheric conditions.* Unless otherwise specified, all tests required by this specification shall be conducted at an atmospheric pressure of approximately 29.92 inches of mercury and at a temperature of approximately 22° C. When tests are made with the atmospheric pressure or the temperature substantially different from the values, allowance shall be made for the variation from the specified condition.

5.2 *Vibration (to minimize friction).* Unless otherwise specified, all tests for performance may be made with the instrument subjected to a vibration of 0.002 to 0.005 inch amplitude at a frequency of 1,500 to 2,000 cycles per minute. The term amplitude, as used herein, indicates the total displacement from positive maximum to negative maximum.

5.3 *Vibration equipment.* Vibration equipment shall be used which will vibrate at any desired frequency between 500 and 3,000 cycles per minute and shall subject the instrument to vibration such that a point on the instrument case will describe, in a plane inclined 45° to the horizontal, a circle, the diameter of which is equal to the amplitude specified herein.

5.4 *Standard pressures.* The standard pressures used in calibrating the altimeters shall be as specified in tables III and IIIa.

6. *Individual performance requirements.* All instruments shall be subjected to what-

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West 39th St., New York, N. Y.

ever tests the manufacturer deems necessary to demonstrate specific compliance with this specification including the following requirements where applicable.

6.1 *Calibration.* For a period of not less than 12 hours prior to this test the altimeter shall not have been operated at other than the pressures specified in section 5.1. The barometric pressure scale shall be set at 29.92 inches of mercury and the scale error recorded. Without changing the setting, the altimeter shall be subjected successively to the pressures specified in table I. The reduction in pressure shall be made at a rate of approximately 3,000 feet per minute. The altimeter shall remain at the pressure corresponding to each test point for at least 1 minute but not more than 10 minutes before a reading is taken. The error at all test points shall not exceed the tolerances specified in table I. The movement of the pointers shall be free from backlash and irregular motion when the pressure is changed uniformly.

6.2 *Case leak.* A pressure equivalent to 18,000 feet within the case shall not result in leakage exceeding the tolerance shown in table II during a period of 10 seconds.

6.3 *Position error.* The change in pointer indication with change in instrument position shall not exceed the tolerance specified in table II.

6.4 *Barometric scale error.* With the ambient pressure constant at 29.92 inches of mercury, various settings of the barometric pressure scale within its range shall cause the pointer to indicate the equivalent altitude as shown in table III within a tolerance of 25 feet.

7. *Qualification tests.* As many instruments as deemed necessary to demonstrate that all instruments will comply with the requirements of this section shall be tested in accordance with the manufacturers' recommendations.

7.1 *Low temperature.* The instrument shall be exposed to a temperature of −30° C. for 3 hours and while at this temperature shall meet the requirements of section 6.1 within the tolerances specified in table I.

7.2 *Extreme temperature exposure.* The instrument shall, after alternate exposures to ambient temperatures of −65° C. and 50° C. for periods of 24 hours each and a delay of 3 hours at room temperature following completion of the exposure, meet the requirements of section 6.1. There shall be no evidence of damage as a result of exposure to the extreme temperatures specified herein.

7.3 *Hysteresis.* Not more than 15 minutes after the altimeter has been first subjected to the pressure corresponding to the upper limit of the scale in section 6.1 the pressure shall be increased at a rate corresponding to a decrease in altitude of approximately 3,000 feet per minute until the pressure corresponding to 25,000 feet is reached. Within 10 seconds the instrument shall indicate within 100 feet of the test reading. The altimeter shall remain at this pressure for at least 5 minutes but not more than 15 minutes before the test reading is taken. After the reading has been taken, the pressure shall be further increased at the above rate until the pressure corresponding to 20,000 feet is reached. The altimeter shall remain at this pressure for at least 1 minute but not more than 10 minutes before the test reading is taken. After the reading has been taken, the pressure shall be further increased at the above rate until atmospheric pressure is reached. The reading of the altimeter at either of the two test points shall not differ from the reading of the altimeter for the corresponding altitude in the scale error test by more than the tolerance specified in table II.

7.4 *After effect.* Not more than 5 minutes after the completion of the hysteresis test, the pointers shall have returned to their original reading, corrected for any change in atmospheric pressure within the tolerance specified in table II.

7.5 *Vibration.* The instrument shall be vibrated at 500 cycles per minute so that a point on the case will describe a circle of 0.003–0.005 inch diameter. The frequency shall be slowly increased to 3,000 cycles per minute and then slowly decreased to 500 cycles per minute, to determine whether the natural frequency of the instrument is in this range. The drift of the pointer shall not exceed 50 feet and it shall not oscillate more than 20 feet. After three hours exposure to the vibration amplitude specified in section 3.3.3 and at the natural frequency (if between 500 and 3,000 cycles per minute) or at 2,000 cycles per minute the instrument shall meet the requirements of section 6. No damage shall be evident after this test.

7.6 *Magnetic effects.* The magnetic effect of the altimeter shall be determined in terms of the deflection of a free magnet approximately 1½ inches long in a magnetic field with a horizontal intensity of 0.18 ± 0.01 gauss, when the indicator is held in various positions on an east-west line with its nearest part 5 inches from the center of the magnet. (An aircraft compass with the compensating magnets removed therefrom may be used as the free magnet for this test.) The maximum deflection of the magnet shall not exceed 1° for any pointer deflection.

7.7 *Humidity.* The instrument shall function and not be adversely affected when exposed to the extreme condition specified in paragraph 3.3.2 for a period of 10 hours.

7.8 *Overpressure.* After being subjected momentarily to an absolute pressure of 50 inches of mercury the pointers shall return to their original reading, corrected for any change in atmospheric pressure, within 30 feet. Complete recovery shall have been effected in not more than 30 minutes after the pressure application.

TABLE I—ALTIMETER SCALE ERRORS

Standard altitude	Equivalent pressure mercury		Tolerance, feet plus or minus	
	MM	IN	Room temperature sec. 6.1	Low temperature sec. 7.1
0	760.0	29.92	20	75
500	746.4	29.39	20	
1,000	732.9	28.86	20	
1,500	719.7	28.33	25	
2,000	706.6	27.82	30	
3,000	681.1	26.81	30	
4,000	656.3	25.84	35	
6,000	609.0	23.98	40	130
8,000	564.4	22.22	60	
10,000	522.6	20.58	80	
12,000	483.3	19.03	120	230
14,000	446.4	17.57	140	
16,000	411.8	16.21	160	
18,000	379.4	14.94	180	340
20,000	349.1	13.75	200	
22,000	320.8	12.63	340	
25,000	281.9	11.10	375	500
30,000	225.6	8.88	450	
35,000	178.7	7.04	525	700
40,000	140.7	5.54	600	
45,000	110.8	4.36	675	
50,000	87.3	3.44	750	1,000

TABLE II

Tests	Reference section	Tolerance, feet plus or minus	
		Type I 35,000	Type II 50,000
Case leak	6.2	100	100
Position error test	6.3	20	20
Hysteresis	7.3		
First test point 25,000		70	150
Second test point 20,000		70	150
After effect test	7.4	50	60

TABLE III-a—ALTITUDE-PRESSURE TABLE—FEET-INCHES

[Altitude in feet, pressure in inches of mercury (° C.)]

P inches	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.8	80, 522	80, 262	80, 005	79, 751	79, 501	79, 253	79, 008	78, 766	78, 526	78, 289
0.9	78, 056	77, 825	77, 596	77, 369	77, 145	76, 924	76, 705	76, 488	76, 272	76, 060
1.0	75, 850	75, 641	75, 435	75, 231	75, 029	74, 828	74, 629	74, 433	74, 238	74, 045
1.1	73, 854	73, 665	73, 477	73, 291	73, 107	72, 924	72, 743	72, 563	72, 384	72, 207
1.2	72, 032	71, 858	71, 686	71, 515	71, 346	71, 178	71, 011	70, 845	70, 681	70, 518
1.3	70, 357	70, 196	70, 037	69, 879	69, 722	69, 566	69, 411	69, 258	69, 106	68, 955
1.4	68, 805	68, 656	68, 508	68, 361	68, 215	68, 070	67, 926	67, 784	67, 642	67, 501
1.5	67, 361	67, 221	67, 082	66, 945	66, 809	66, 674	66, 539	66, 405	66, 272	66, 140
1.6	66, 009	65, 879	65, 749	65, 620	65, 492	65, 365	65, 239	65, 113	64, 988	64, 864
1.7	64, 740	64, 617	64, 495	64, 374	64, 253	64, 133	64, 014	63, 895	63, 777	63, 660
1.8	63, 543	63, 427	63, 311	63, 196	63, 082	62, 969	62, 856	62, 744	62, 632	62, 521
1.9	62, 411	62, 301	62, 191	62, 082	61, 974	61, 867	61, 760	61, 654	61, 548	61, 442
2.0	61, 337	61, 232	61, 128	61, 025	60, 922	60, 820	60, 618	60, 617	60, 516	60, 416
2.1	60, 315	60, 215	60, 116	60, 018	59, 920	59, 823	59, 726	59, 629	59, 533	59, 437
2.2	59, 341	59, 246	59, 152	59, 058	58, 964	58, 871	58, 778	58, 686	58, 594	58, 502
2.3	58, 411	58, 320	58, 229	58, 139	58, 049	57, 960	57, 871	57, 782	57, 694	57, 606
2.4	57, 519	57, 432	57, 345	57, 259	57, 173	57, 088	57, 003	56, 918	56, 833	56, 749
2.5	56, 665	56, 581	56, 498	56, 415	56, 332	56, 250	56, 168	56, 086	56, 005	55, 924
2.6	55, 844	55, 763	55, 683	55, 603	55, 524	55, 445	55, 366	55, 287	55, 209	55, 131
2.7	55, 053	54, 975	54, 898	54, 821	54, 745	54, 669	54, 593	54, 517	54, 442	54, 367
2.8	54, 292	54, 217	54, 143	54, 069	53, 995	53, 921	53, 848	53, 775	53, 702	53, 629
2.9	53, 557	53, 485	53, 413	53, 341	53, 270	53, 199	53, 127	53, 057	52, 987	52, 917
3.0	52, 847	52, 777	52, 707	52, 638	52, 570	52, 501	52, 432	52, 364	52, 296	52, 228
3.1	52, 161	52, 093	52, 026	51, 959	51, 892	51, 826	51, 759	51, 693	51, 627	51, 561
3.2	51, 496	51, 430	51, 365	51, 300	51, 235	51, 171	51, 107	51, 043	50, 979	50, 916
3.3	50, 852	50, 789	50, 726	50, 663	50, 600	50, 537	50, 475	50, 413	50, 351	50, 290
3.4	50, 228	50, 167	50, 104	50, 044	49, 982	49, 922	49, 862	49, 801	49, 741	49, 680
3.5	49, 620	49, 561	49, 501	49, 442	49, 382	49, 323	49, 264	49, 206	49, 147	49, 089
3.6	49, 030	48, 972	48, 915	48, 857	48, 799	48, 741	48, 684	48, 627	48, 570	48, 513
3.7	48, 456	48, 400	48, 344	48, 288	48, 232	48, 175	48, 120	48, 065	48, 009	47, 954
3.8	47, 898	47, 843	47, 789	47, 734	47, 679	47, 624	47, 570	47, 516	47, 462	47, 408
3.9	47, 354	47, 301	47, 248	47, 194	47, 141	47, 088	47, 035	46, 982	46, 930	46, 877
4.0	46, 824	46, 772	46, 720	46, 668	46, 616	46, 564	46, 513	46, 461	46, 410	46, 358
4.1	46, 307	46, 256	46, 206	46, 155	46, 104	46, 053	46, 003	45, 953	45, 903	45, 853
4.2	45, 803	45, 753	45, 704	45, 654	45, 605	45, 555	45, 506	45, 458	45, 408	45, 359
4.3	45, 310	45, 262	45, 213	45, 165	45, 117	45, 068	45, 020	44, 973	44, 925	44, 877
4.4	44, 829	44, 782	44, 734	44, 687	44, 640	44, 592	44, 546	499	44, 452	44, 405
4.5	44, 358	44, 312	44, 266	44, 220	44, 173	44, 127	44, 081	44, 036	43, 990	43, 944
4.6	43, 898	43, 853	43, 808	43, 762	43, 717	43, 672	43, 627	43, 582	537	492
4.7	448	43, 403	43, 359	43, 315	43, 270	43, 226	43, 182	43, 138	43, 094	43, 050
4.8	43, 007	42, 963	42, 920	42, 876	42, 833	42, 790	42, 747	42, 704	42, 661	42, 618
4.9	42, 575	532	490	447	42, 404	42, 362	42, 320	42, 278	42, 236	42, 193
5.0	42, 151	42, 110	42, 068	42, 026	41, 985	41, 943	41, 902	41, 861	41, 819	41, 778
5.1	41, 737	41, 696	41, 655	41, 614	573	532	492	451	411	370
5.2	41, 330	41, 290	41, 250	41, 210	41, 170	41, 130	41, 090	41, 050	41, 011	40, 971
5.3	40, 931	40, 892	40, 853	40, 813	40, 774	40, 735	40, 696	40, 657	40, 618	579
5.4	540	502	463	425	386	40, 347	40, 309	40, 271	40, 233	40, 195

TABLE III-a—ALTITUDE-PRESSURE TABLE—FEET-INCHES—Continued

[Altitude in feet, pressure in inches of mercury (° C.)]

P inches	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
5.5	40,156	40,118	40,080	40,043	40,005	39,967	39,929	39,892	39,854	39,816
5.6	39,779	39,742	39,704	39,667	39,630	593	556	519	482	445
5.7	408	372	39,335	39,298	39,262	39,225	39,189	39,153	39,117	39,080
5.8	39,044	39,008	38,972	38,936	38,900	38,864	38,829	38,793	38,757	38,722
5.9	38,686	38,651	615	580	545	509	474	439	404	369
6.0	38,334	38,300	38,265	38,230	38,200	38,161	38,126	38,092	38,057	38,023
6.1	37,989	37,954	37,920	37,886	37,852	37,818	37,784	37,750	37,716	37,682
6.2	648	615	581	547	514	480	447	413	380	346
6.3	37,313	37,280	37,247	37,214	37,181	37,147	37,115	37,082	37,049	37,016
6.4	36,983	36,951	36,918	36,886	36,853	36,820	36,788	36,756	36,723	36,691
6.5	659	627	595	563	531	498	467	435	403	371
6.6	339	36,308	36,276	36,245	36,213	36,181	36,150	36,110	36,087	36,056
6.7	36,024	35,993	35,962	35,931	35,900	35,869	35,838	35,807	35,776	35,745
6.8	35,714	683	653	622	591	560	530	499	469	438
6.9	408	378	347	317	35,287	35,257	35,227	35,197	35,167	35,136
7.0	35,106	35,077	35,047	35,017	34,987	34,957	34,927	34,898	34,868	34,838
7.1	34,809	34,779	34,749	34,720	690	661	631	602	573	543
7.2	514	485	455	426	397	368	339	310	34,281	34,251
7.3	34,222	34,194	34,165	34,136	34,107	34,078	34,049	34,020	33,992	33,963
7.4	33,934	33,906	33,877	33,848	33,820	33,791	33,763	33,734	706	678
7.5	649	621	593	564	536	508	480	452	424	395
7.6	367	339	311	283	33,255	33,227	33,200	33,172	33,144	33,116
7.7	33,088	33,061	33,033	33,005	32,978	32,950	32,922	32,895	32,867	32,840
7.8	32,812	32,785	32,758	32,730	703	676	648	621	594	567
7.9	539	512	485	458	431	404	377	350	323	296
8.0	269	32,242	32,215	32,188	32,161	32,135	32,108	32,081	32,054	32,028
8.1	32,001	31,975	31,948	31,921	31,895	31,868	31,842	31,815	31,789	31,763
8.2	31,736	710	684	657	631	605	578	552	526	500
8.3	474	448	422	396	370	344	318	292	266	31,240
8.4	31,214	31,188	31,163	31,137	31,111	31,085	31,060	31,034	31,008	30,983
8.5	30,957	30,931	30,906	30,880	30,855	30,829	30,804	30,778	30,753	728
8.6	702	677	652	626	601	576	550	525	500	475
8.7	449	424	399	374	349	324	299	274	249	30,224
8.8	30,199	30,174	30,149	30,125	30,100	30,075	30,050	30,025	30,001	29,976
8.9	29,951	29,927	29,902	29,877	29,853	29,828	29,804	29,779	29,755	730
9.0	706	681	657	633	608	584	560	535	511	487
9.1	462	438	414	390	366	342	317	293	269	245
9.2	29,221	29,197	29,173	29,149	29,125	29,101	29,077	29,053	29,029	29,005
9.3	28,982	28,958	28,934	28,910	28,887	28,863	28,839	28,816	28,792	28,768
9.4	745	721	698	674	650	627	603	580	556	533
9.5	510	486	463	439	416	393	369	346	323	300
9.6	276	253	230	28,207	28,184	28,161	28,138	28,115	28,092	28,069
9.7	28,046	28,023	28,000	27,977	27,954	27,931	27,908	27,885	27,862	27,839
9.8	27,816	27,794	27,771	748	725	702	680	657	634	612
9.9	589	566	544	521	499	476	453	431	408	386
10.0	363	341	318	396	274	251	229	27,206	27,184	27,162
10.1	27,140	117	095	073	050	028	006	26,984	26,962	26,940
10.2	26,917	895	873	851	829	807	785	763	741	719
10.3	697	676	654	632	610	588	566	544	523	501
10.4	479	457	436	27,414	27,392	27,371	27,349	327	306	284
10.5	262	27,241	27,219	26,198	26,176	26,155	26,133	26,112	26,090	26,069
10.6	26,048	26,026	26,005	25,984	25,962	25,941	25,919	25,898	25,877	25,856
10.7	25,834	25,813	25,792	771	749	728	707	686	665	644
10.8	622	601	580	559	538	517	496	475	454	433
10.9	412	391	370	350	329	308	287	266	245	224
11.0	25,204	25,183	25,162	25,141	25,121	25,100	25,079	25,059	25,038	25,017
11.1	24,996	24,976	24,955	24,935	24,914	24,894	24,873	24,852	24,832	24,811
11.2	791	770	750	730	709	689	668	648	628	607
11.3	587	567	546	526	506	486	465	445	425	405
11.4	384	364	344	324	304	284	263	243	223	203
11.5	24,183	24,163	24,143	24,123	24,103	24,083	24,063	24,043	24,023	24,003
11.6	23,983	23,963	23,944	23,924	23,904	23,884	23,864	23,844	23,824	23,805
11.7	785	765	745	726	706	686	666	647	627	607
11.8	588	568	549	529	509	490	470	451	431	412
11.9	392	373	353	334	314	295	275	256	237	217
12.0	198	23,178	23,159	23,140	23,121	23,101	23,082	23,063	23,043	23,024
12.1	23,005	22,986	22,966	22,947	22,928	22,909	22,890	22,870	22,851	22,832
12.2	22,813	794	775	755	737	718	698	679	660	641
12.3	622	603	584	565	547	528	509	490	471	452
12.4	433	414	395	377	358	339	320	301	282	264
12.5	245	226	207	189	22,170	22,151	22,133	22,114	22,095	22,077
12.6	22,058	22,040	22,021	22,002	21,984	21,965	21,947	21,928	21,910	21,891
12.7	21,872	21,854	21,836	21,817	799	780	762	743	725	706
12.8	688	670	651	633	615	596	578	560	542	523
12.9	505	487	469	450	432	414	396	377	359	341
13.0	323	305	287	268	250	232	214	196	21,178	21,160
13.1	21,142	21,124	21,105	21,087	21,069	21,052	21,034	21,016	20,998	20,980
13.2	20,962	20,944	20,926	20,908	20,890	20,873	20,855	20,837	819	801
13.3	783	765	748	730	712	694	677	659	641	623
13.4	605	588	570	552	535	517	499	482	464	446

TABLE III-a—ALTITUDE-PRESSURE TABLE—FEET-INCHES—Continued

[Altitude in feet, pressure in inches of mercury (° C.)]

P inches	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
13.5	429	411	394	376	358	341	323	306	288	271
13.6	253	236	218	201	183	20,166	20,149	20,131	20,114	20,096
13.7	20,079	20,061	20,044	20,027	20,009	19,992	19,975	19,957	19,940	19,922
13.8	19,905	19,888	19,871	19,853	19,836	819	802	784	767	750
13.9	733	715	698	681	664	647	630	613	595	578
14.0	561	544	527	510	493	476	459	442	425	408
14.1	391	374	357	340	323	306	289	272	255	238
14.2	221	204	187	170	19,154	19,137	19,120	19,103	19,086	19,069
14.3	19,052	19,036	19,019	19,002	18,985	18,969	18,952	18,935	18,918	18,902
14.4	18,885	18,868	18,852	18,835	818	802	785	768	752	735
14.5	718	702	685	668	652	635	619	602	586	569
14.6	553	536	520	503	487	470	454	437	421	404
14.7	388	371	355	339	322	305	289	273	257	240
14.8	224	208	191	175	18,159	18,142	18,126	18,110	18,093	18,077
14.9	18,061	18,045	18,028	18,012	17,996	17,980	17,963	17,947	17,931	17,915
15.0	17,899	17,882	17,866	17,850	834	818	802	786	770	754
15.1	737	721	705	689	673	657	641	625	609	593
15.2	577	561	545	529	513	497	481	465	449	433
15.3	417	402	386	370	354	338	322	306	290	275
15.4	259	243	227	211	196	180	164	17,148	17,132	17,117
15.5	17,101	17,085	17,069	17,054	17,038	17,022	17,007	16,991	16,975	16,959
15.6	16,944	16,928	16,912	16,897	16,881	16,866	16,850	834	819	803
15.7	787	772	756	741	725	710	694	679	663	648
15.8	632	617	601	586	570	555	539	524	508	493
15.9	477	462	447	431	416	400	385	370	354	339
16.0	324	308	293	278	262	247	232	216	201	186
16.1	171	155	16,140	16,125	16,110	16,094	16,079	16,064	16,049	16,034
16.2	16,018	16,003	15,988	15,973	15,958	15,943	15,927	15,912	15,897	15,882
16.3	15,867	15,852	837	822	806	791	776	761	746	731
16.4	716	701	686	671	656	641	626	611	596	581
16.5	566	551	536	521	506	491	476	461	446	431
16.6	416	402	387	372	357	342	327	312	298	283
16.7	268	253	238	224	209	194	179	164	150	15,135
16.8	15,120	15,105	15,091	15,076	15,061	15,047	15,032	15,017	15,002	14,988
16.9	14,973	14,958	14,944	14,929	14,914	14,900	14,885	14,870	14,856	841
17.0	826	812	797	783	768	753	739	724	710	695
17.1	681	666	652	637	622	608	594	579	564	550
17.2	536	521	507	492	478	463	449	434	420	406
17.3	391	377	362	348	334	319	305	291	276	262
17.4	247	233	219	204	190	176	162	147	14,133	14,119
17.5	14,104	14,090	14,076	14,062	14,047	14,033	14,019	14,005	13,990	13,976
17.6	13,962	13,948	13,934	13,919	13,905	13,891	13,877	13,863	849	834
17.7	820	806	792	778	764	750	736	722	707	693
17.8	679	665	651	637	623	609	595	581	567	553
17.9	539	525	511	497	483	469	455	441	427	413
18.0	399	385	371	357	343	329	315	301	287	274
18.1	260	246	232	218	204	190	176	163	149	13,135
18.2	13,121	13,107	13,094	13,080	13,066	13,052	13,038	13,025	13,011	12,997
18.3	12,983	12,970	12,956	12,942	12,928	12,915	12,901	12,887	12,873	860
18.4	846	832	819	805	791	778	764	750	736	723
18.5	709	695	682	668	655	641	627	614	600	587
18.6	573	559	546	532	519	505	492	478	464	451
18.7	437	424	410	397	383	370	356	343	329	316
18.8	302	289	275	262	249	235	222	208	195	181
18.9	168	155	141	12,128	12,114	12,101	12,088	12,074	12,061	12,048
19.0	12,034	12,021	12,008	11,994	11,981	11,968	11,954	11,941	11,928	11,914
19.1	11,901	11,888	11,874	861	848	835	821	808	795	781
19.2	768	755	742	729	715	702	689	676	663	649
19.3	636	623	610	597	584	570	557	544	531	518
19.4	505	491	478	465	452	439	426	413	400	387
19.5	374	360	347	334	321	308	295	282	269	256
19.6	243	230	217	204	191	178	165	152	139	11,126
19.7	11,113	11,100	11,087	11,074	11,061	11,048	11,035	11,023	11,010	10,997
19.8	10,984	10,971	10,958	10,945	10,932	10,919	10,906	10,894	10,881	868
19.9	855	842	829	816	804	791	778	765	752	739
20.0	726	714	701	688	675	662	650	637	624	611
20.1	599	586	573	560	548	535	522	509	497	484
20.2	471	459	446	433	421	408	395	383	370	357
20.3	344	332	319	307	294	281	269	256	243	231
20.4	218	206	193	180	168	155	143	130	10,117	10,105
20.5	10,092	10,080	10,067	10,055	10,042	10,030	10,017	10,005	9,992	9,980
20.6	9,967	9,955	9,942	9,930	9,917	9,905	9,892	9,880	9,867	9,855
20.7	9,842	9,830	9,817	9,805	9,793	9,780	9,768	9,755	9,743	9,730
20.8	9,718	9,706	9,693	9,681	9,668	9,656	9,644	9,631	9,619	9,607
20.9	9,594	9,582	9,570	9,557	9,545	9,532	9,520	9,508	9,495	9,483
21.0	9,471	9,458	9,446	9,434	9,422	9,409	9,397	9,385	9,372	9,360
21.1	9,348	9,336	9,323	9,311	9,299	9,287	9,274	9,262	9,250	9,238
21.2	9,225	9,213	9,201	9,189	9,176	9,164	9,152	9,140	9,128	9,116
21.3	9,103	9,091	9,079	9,067	9,055	9,043	9,030	9,018	9,006	8,994
21.4	8,982	8,970	8,958	8,946	8,933	8,921	8,909	8,897	8,885	8,873

TABLE III-a—ALTITUDE-PRESSURE TABLE—FEET-INCHES—Continued

[Altitude in feet, pressure in inches of mercury (° C.)]

P inches	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
21.5	8,861	8,849	8,837	8,825	8,813	8,801	8,789	8,776	8,764	8,752
21.6	8,740	8,728	8,716	8,704	8,692	8,680	8,668	8,656	8,644	8,632
21.7	8,620	8,608	8,596	8,584	8,572	8,560	8,548	8,536	8,524	8,512
21.8	8,500	8,489	8,477	8,465	8,453	8,441	8,429	8,417	8,405	8,393
21.9	8,381	8,369	8,357	8,346	8,334	8,322	8,310	8,298	8,286	8,274
22.0	8,262	8,250	8,239	8,227	8,215	8,203	8,191	8,179	8,168	8,156
22.1	8,144	8,132	8,120	8,109	8,097	8,085	8,073	8,061	8,050	8,038
22.2	8,026	8,014	8,003	7,991	7,979	7,967	7,956	7,944	7,932	7,920
22.3	7,909	7,897	7,885	7,873	7,862	7,850	7,838	7,827	7,815	7,803
22.4	7,791	7,780	7,768	7,756	7,745	7,733	7,721	7,710	7,698	7,686
22.5	7,675	7,663	7,652	7,640	7,628	7,617	7,605	7,593	7,582	7,570
22.6	7,559	7,547	7,535	7,524	7,512	7,501	7,489	7,478	7,466	7,454
22.7	7,443	7,431	7,420	7,408	7,397	7,385	7,374	7,362	7,350	7,339
22.8	7,327	7,316	7,304	7,293	7,281	7,270	7,258	7,247	7,235	7,224
22.9	7,212	7,201	7,189	7,178	7,167	7,155	7,144	7,132	7,121	7,109
23.0	7,098	7,086	7,075	7,064	7,052	7,041	7,029	7,018	7,006	6,995
23.1	6,984	6,972	6,961	6,949	6,938	6,927	6,915	6,904	6,893	6,881
23.2	6,870	6,858	6,847	6,836	6,824	6,813	6,802	6,790	6,779	6,768
23.3	6,756	6,745	6,734	6,722	6,711	6,700	6,688	6,677	6,666	6,655
23.4	6,643	6,632	6,621	6,610	6,598	6,587	6,576	6,564	6,553	6,542
23.5	6,531	6,519	6,508	6,497	6,486	6,475	6,463	6,452	6,441	6,430
23.6	6,418	6,407	6,396	6,385	6,374	6,363	6,351	6,340	6,329	6,318
23.7	6,307	6,296	6,284	6,273	6,262	6,251	6,240	6,229	6,218	6,206
23.8	6,195	6,184	6,173	6,162	6,151	6,140	6,129	6,118	6,106	6,095
23.9	6,084	6,073	6,062	6,051	6,040	6,029	6,018	6,007	5,996	5,985
24.0	5,974	5,962	5,951	5,940	5,929	5,918	5,907	5,896	5,885	5,874
24.1	5,863	5,852	5,841	5,830	5,819	5,808	5,797	5,786	5,775	5,764
24.2	5,753	5,742	5,731	5,720	5,709	5,698	5,687	5,676	5,666	5,655
24.3	5,644	5,633	5,622	5,611	5,600	5,589	5,578	5,567	5,555	5,545
24.4	5,534	5,524	5,513	5,502	5,491	5,480	5,469	5,458	5,447	5,436
24.5	5,425	5,415	5,404	5,393	5,382	5,371	5,360	5,350	5,339	5,328
24.6	5,317	5,306	5,295	5,285	5,274	5,263	5,252	5,241	5,230	5,220
24.7	5,209	5,198	5,187	5,176	5,166	5,155	5,144	5,133	5,133	5,112
24.8	5,101	5,090	5,080	5,069	5,058	5,047	5,037	5,026	5,015	5,004
24.9	4,994	4,983	4,972	4,961	4,951	4,940	4,929	4,919	4,908	4,897
25.0	4,886	4,876	4,865	4,854	4,844	4,833	4,822	4,812	4,801	4,790
25.1	4,780	4,769	4,758	4,748	4,737	4,726	4,716	4,705	4,695	4,684
25.2	4,673	4,663	4,652	4,642	4,631	4,620	4,610	4,599	4,588	4,578
25.3	4,567	4,557	4,546	4,536	4,525	4,514	4,504	4,493	4,483	4,472
25.4	4,462	4,451	4,440	4,430	4,419	4,409	4,398	4,388	4,377	4,367
25.5	4,356	4,346	4,335	4,325	4,314	4,304	4,293	4,283	4,272	4,262
25.6	4,251	4,241	4,230	4,210	4,209	4,199	4,188	4,178	4,167	4,157
25.7	4,146	4,136	4,125	4,115	4,105	4,094	4,084	4,073	4,063	4,052
25.8	4,042	4,032	4,021	4,011	4,000	3,990	3,980	3,969	3,959	3,948
25.9	3,938	3,928	3,917	3,907	3,896	3,886	3,876	3,865	3,855	3,845
26.0	3,834	3,824	3,814	3,803	3,793	3,782	3,772	3,762	3,751	3,741
26.1	3,731	3,720	3,710	3,700	3,689	3,679	3,669	3,659	3,648	3,638
26.2	3,628	3,617	3,607	3,597	3,586	3,576	3,566	3,556	3,545	3,535
26.3	3,525	3,515	3,504	3,494	3,484	3,474	3,463	3,453	3,443	3,433
26.4	3,422	3,412	3,402	3,392	3,382	3,371	3,361	3,351	3,341	3,331
26.5	3,320	3,310	3,300	3,290	3,279	3,269	3,259	3,249	3,239	3,229
26.6	3,218	3,208	3,198	3,188	3,178	3,168	3,157	3,147	3,137	3,127
26.7	3,117	3,107	3,097	3,086	3,076	3,066	3,056	3,046	3,036	3,026
26.8	3,016	3,005	2,995	2,985	2,975	2,965	2,955	2,945	2,935	2,925
26.9	2,915	2,905	2,895	2,884	2,874	2,864	2,854	2,844	2,834	2,824
27.0	2,814	2,804	2,794	2,784	2,774	2,764	2,754	2,744	2,734	2,724
27.1	2,714	2,704	2,694	2,684	2,674	2,664	2,654	2,644	2,634	2,624
27.2	2,614	2,604	2,594	2,584	2,574	2,564	2,554	2,544	2,534	2,524
27.3	2,514	2,504	2,494	2,484	2,474	2,464	2,454	2,444	2,434	2,425
27.4	2,415	2,405	2,395	2,385	2,375	2,365	2,355	2,345	2,335	2,325
27.5	2,315	2,306	2,296	2,286	2,276	2,266	2,256	2,246	2,236	2,226
27.6	2,217	2,207	2,197	2,187	2,177	2,167	2,158	2,148	2,138	2,128
27.7	2,118	2,108	2,098	2,089	2,079	2,069	2,059	2,049	2,040	2,030
27.8	2,020	2,010	2,000	1,990	1,981	1,971	1,961	1,951	1,942	1,932
27.9	1,922	1,912	1,912	1,893	1,883	1,873	1,863	1,854	1,844	1,834
28.0	1,824	1,814	1,805	1,795	1,785	1,776	1,766	1,756	1,746	1,737
28.1	1,727	1,717	1,707	1,698	1,688	1,678	1,668	1,659	1,649	1,639
28.2	1,630	1,620	1,610	1,601	1,591	1,581	1,572	1,562	1,552	1,542
28.3	1,533	1,523	1,513	1,504	1,494	1,484	1,475	1,465	1,456	1,446
28.4	1,436	1,427	1,417	1,407	1,398	1,388	1,378	1,369	1,359	1,350
28.5	1,340	1,330	1,321	1,311	1,302	1,292	1,282	1,273	1,263	1,254
28.6	1,244	1,234	1,225	1,215	1,206	1,196	1,186	1,177	1,167	1,158

TABLE III-a—ALTITUDE-PRESSURE TABLE—FEET-INCHES—Continued

[Altitude in feet, pressure in inches of mercury (° C.)]

P inches	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
28.7	1,148	1,139	1,129	1,120	1,110	1,100	1,091	1,081	1,072	1,062
28.8	1,053	1,043	1,034	1,024	1,015	1,005	995	986	976	967
28.9	957	948	938	929	919	910	900	891	881	872
29.0	863	853	844	834	825	815	806	796	787	777
29.1	768	758	749	739	730	721	711	702	692	683
29.2	673	664	655	645	636	626	617	607	598	589
29.3	579	570	560	551	542	532	523	514	504	495
29.4	485	476	467	457	448	439	429	420	410	401
29.5	392	382	373	364	354	345	335	326	317	307
29.6	298	289	280	270	261	252	242	233	224	215
29.7	205	196	187	177	168	159	149	140	131	122
29.8	112	103	94	85	75	66	57	47	38	29
29.9	20	10	1	−8	−17	−26	−36	−45	−54	−63
30.0	−73	−82	−91	−100	−110	−119	−128	−137	−146	−156
30.1	−165	−174	−183	−192	−202	−211	−220	−229	−238	−248
30.2	−257	−266	−275	−284	−293	−303	−312	−321	−330	−339
30.3	−348	−358	−367	−376	−385	−394	−403	−412	−421	−431
30.4	−440	−449	−458	−467	−476	−485	−494	−504	−513	−522
30.5	−531	−540	−549	−558	−567	−576	−585	−594	−604	−613
30.6	−622	−631	−640	−649	−658	−667	−676	−685	−694	−703
30.7	−712	−721	−730	−740	−749	−758	−767	−776	−785	−749
30.8	−803	−812	−821	−830	−839	−848	−857	−866	−875	−886
30.9	−893	−902	−911	−920	−929	−938	−947	−956	−965	−944
31.0	−983	−992	−1.001	−1.010	−1.019	−1.028	−1.037	−1.046	−1.055	1.074

TABLE III-b—ALTITUDE-PRESSURE TABLE—FEET-MILLIBARS

[Altitude in feet, pressure in millibars]

Pressure Millibars	0	1	2	3	4	5	6	7	8	9
10	101,389	99,393	97,573	95,896	94,346	92,899	91,548	90,279	89,082	87,950
20	86,876	85,854	84,880	83,950	83,059	82,204	81,383	80,592	79,832	79,099
30	78,386	77,700	77,035	76,392	75,766	75,159	74,569	73,996	73,437	72,894
40	72,363	71,846	71,341	70,850	70,367	69,897	69,437	68,986	68,545	68,114
50	67,691	67,277	66,870	66,470	66,079	65,695	65,318	64,947	64,583	64,226
60	63,873	63,527	63,187	62,852	62,522	62,198	61,878	61,563	61,253	60,947
70	60,646	60,348	60,056	59,768	59,483	59,202	58,924	58,651	58,381	58,114
80	57,850	57,590	57,333	57,079	56,828	56,580	56,335	56,093	55,854	55,617
90	55,383	55,152	54,924	54,697	54,471	54,252	54,032	53,815	53,601	53,388
100	53,178	52,969	52,763	52,559	52,357	52,157	51,958	51,761	51,656	51,374
110	51,182	50,993	50,805	50,619	50,433	50,251	50,071	49,891	49,713	49,536
120	59,360	49,187	49,014	48,844	48,674	48,506	48,339	48,173	48,009	47,846
130	47,685	47,525	47,365	47,207	47,050	46,895	46,740	46,587	46,434	46,283
140	46,133	45,984	45,836	45,690	45,543	45,399	45,255	45,111	44,970	44,829
150	44,689	44,550	44,411	44,274	44,138	44,002	43,867	43,734	43,601	43,469
160	43,337	43,207	43,077	42,948	42,820	42,693	42,566	42,440	42,315	42,191
170	42,067	41,944	41,822	41,701	41,580	41,460	41,341	41,222	41,104	40,987
180	40,870	40,754	40,639	40,525	40,411	40,297	40,184	40,072	39,961	39,850
190	39,739	39,629	39,520	39,411	39,303	39,195	39,088	38,981	38,875	38,769
200	38,664	38,560	38,456	38,353	38,250	38,148	38,046	37,945	37,844	37,744
210	37,644	37,544	37,445	37,347	37,249	37,151	37,054	36,957	36,861	36,765
220	36,669	36,575	36,480	36,386	36,292	36,199	36,106	36,014	35,922	35,830
230	35,739	35,648	35,557	35,467	35,377	35,288	35,199	35,110	35,022	34,934
240	34,846	34,759	34,672	34,585	34,498	34,412	34,326	34,240	34,154	34,069
250	33,984	33,900	33,815	33,731	33,647	33,564	33,481	33,398	33,315	33,232
260	33,150	33,068	32,986	32,905	32,823	32,743	32,662	32,581	32,501	32,421
270	32,341	32,262	32,182	32,103	32,024	31,946	31,867	31,789	31,711	31,634
280	31,556	31,479	31,402	31,325	31,249	31,172	31,096	31,021	30,945	30,869
290	30,794	30,719	30,644	30,570	30,495	30,421	30,347	30,273	30,199	30,126
300	30,052	29,979	29,907	29,834	29,762	29,690	29,618	29,546	29,474	29,403
310	29,331	29,260	29,189	29,118	29,048	28,977	28,907	28,837	28,767	28,697
320	28,628	28,559	28,489	28,420	28,351	28,283	28,214	28,146	28,078	28,011
330	27,943	27,875	27,807	27,740	27,673	27,606	27,539	27,473	27,406	27,340
340	27,273	27,207	27,141	27,076	27,010	26,945	26,879	26,814	26,749	26,685
350	26,620	26,555	26,491	26,427	26,363	26,299	26,235	26,172	26,108	26,045
360	25,982	25,919	25,856	25,793	25,730	25,668	25,606	25,544	25,482	25,420
370	25,358	25,296	25,234	25,173	25,112	25,051	24,990	24,929	24,868	24,807
380	24,747	24,687	24,627	24,567	24,507	24,447	24,387	24,328	24,268	24,209

TABLE III-b—ALTITUDE-PRESSURE TABLE—FEET-MILLIBARS—Continued

[Altitude in feet, pressure in millibars]

Pressure Millibars	0	1	2	3	4	5	6	7	8	9
390	24 150	24 091	24 032	23 973	23 914	23 855	23 797	23 739	23 680	23 622
400	23 564	23 506	23 449	23 391	23 333	23 276	23 218	23 161	23 104	23 047
410	22 990	22 934	22 877	22 821	22 764	22 708	22 652	22 596	22 540	22 484
420	22 428	22 372	22 316	22 261	22 206	22 151	22 095	22 040	21 986	21 931
430	21 876	21 821	21 767	21 713	21 658	21 604	21 550	21 496	21 442	21 388
440	21 335	21 281	21 228	21 174	21 121	21 068	21 015	20 962	20 909	20 856
450	20 804	20 751	20 698	20 645	20 593	20 541	20 489	20 437	20 385	20 333
460	20 281	20 229	20 178	20 126	20 075	20 024	19 973	19 921	19 870	19 819
470	19 769	19 718	19 667	19 616	19 566	19 515	19 465	19 414	19 364	19 314
480	19 264	19 214	19 165	19 115	19 065	19 015	18 966	18 917	18 867	18 818
490	18 769	18 720	18 670	18 621	18 573	18 524	18 475	18 426	18 378	18 330
500	18 281	18 233	18 185	18 136	18 088	18 040	17 993	17 945	17 897	17 849
510	17 802	17 754	17 706	17 659	17 612	17 564	17 517	17 470	17 423	17 376
520	17 329	17 282	17 235	17 189	17 142	17 096	17 049	17 003	16 956	16 910
530	16 864	16 818	16 772	16 726	16 680	16 634	16 589	16 543	16 497	16 452
540	16 406	16 361	16 316	16 270	16 225	16 180	16 135	16 090	16 045	16 000
550	15 955	15 911	15 866	15 821	15 777	15 732	15 688	15 644	15 599	15 555
560	15 511	15 467	15 428	15 379	15 335	15 291	15 247	15 203	15 160	15 116
570	15 073	15 029	14 986	14 943	14 899	14 856	14 813	14 770	14 726	14 683
580	14 641	14 598	14 555	14 510	14 470	14 427	14 384	14 342	14 300	14 257
590	14 214	14 172	14 130	14 088	14 046	14 004	13 962	13 920	13 878	13 836
600	13 795	13 753	13 711	13 670	13 628	13 587	13 545	13 504	13 463	13 422
610	13 380	13 339	13 298	13 257	13 216	13 175	13 134	13 093	13 052	13 012
620	12 972	12 931	12 890	12 850	12 809	12 769	12 728	12 688	12 648	12 608
630	12 568	12 528	12 488	12 448	12 408	12 368	12 328	12 288	12 248	12 209
640	12 169	12 130	12 090	12 051	12 011	11 972	11 932	11 893	11 854	11 815
650	11 776	11 737	11 698	11 659	11 620	11 581	11 542	11 503	11 464	11 426
660	11 387	11 349	11 310	11 271	11 233	11 195	11 156	11 118	11 079	11 041
670	11 003	10 965	10 927	10 889	10 851	10 813	10 775	10 737	10 699	10 661
680	10 624	10 586	10 548	10 510	10 473	10 435	10 398	10 360	10 323	10 286
690	10 249	10 211	10 174	10 137	10 100	10 063	10 026	9 989	9 952	9 915
700	9 878	9 841	9 805	9 768	9 732	9 695	9 659	9 622	9 585	9 548
710	9 512	9 476	9 440	9 403	9 367	9 331	9 295	9 258	9 222	9 186
720	9 150	9 114	9 079	9 043	9 007	8 970	8 934	8 899	8 864	8 828
730	9 792	8 757	8 721	8 685	8 650	8 615	8 579	8 544	8 509	8 473
740	8 438	8 403	8 368	8 333	8 298	8 262	8 222	8 192	8 158	8 123
750	8 088	8 053	8 018	7 983	7 949	7 914	7 880	7 815	7 810	7 776
760	7 742	7 707	7 672	7 638	7 604	7 570	7 535	7 501	7 467	7 433
770	7 398	7 364	7 330	7 296	7 262	7 229	7 195	7 161	7 127	7 094
780	7 060	7 026	6 992	6 958	6 925	6 891	6 857	6 823	6 791	6 757
790	6 724	6 690	6 657	6 624	6 590	6 557	6 524	5 491	6 458	6 425
800	6 392	6 359	6 326	6 293	6 260	6 227	6 194	6 161	6 128	6 096
810	6 068	6 030	5 998	5 965	5 932	5 900	5 867	5 835	5 802	5 769
820	5 737	5 705	5 672	5 640	5 608	5 576	5 543	5 511	5 472	5 447
830	5 415	5 383	5 351	5 319	5 287	5 255	5 223	5 191	5 159	5 127
840	5 096	5 064	5 032	5 000	4 969	4 937	4 905	4 874	4 842	4 811
850	4 779	4 748	4 716	4 685	4 654	4 622	4 591	4 560	4 528	4 497
860	4 466	4 435	4 404	4 373	4 342	4 311	4 280	4 249	4 218	4 187
870	4 156	4 125	4 094	4 063	4 032	4 002	3 971	3 940	3 910	3 879
880	3 848	3 818	3 787	3 757	3 726	3 696	3 665	3 635	3 604	3 574
890	3 544	3 513	3 483	3 453	3 423	3 393	3 362	3 332	3 302	3 272
900	3 242	3 212	3 182	3 152	3 122	3 092	3 062	3 032	3 002	2 973
910	2 943	2 913	2 883	2 854	2 824	2 794	2 765	2 735	2 705	2 676
920	2 646	2 617	2 587	2 558	2 529	2 499	2 470	2 441	2 411	2 382
930	2 352	2 323	2 294	2 265	2 236	2 206	2 177	2 148	2 119	2 090
940	2 061	2 032	2 003	1 974	1 945	1 916	1 887	1 859	1 830	1 801
950	1 772	1 743	1 715	1 686	1 657	1 629	1 600	1 572	1 543	1 514
960	1 486	1 458	1 429	1 400	1 372	1 344	1 315	1 287	1 259	1 230
970	1 202	1 174	1 145	1 117	1 089	1 061	1 033	1 005	976	948
980	920	892	865	836	808	780	752	724	697	669
990	641	613	585	558	530	502	474	447	419	391
1,000	364	336	309	281	254	226	199	171	144	117
1,010	89	62	34	7	−20	−48	−75	−102	−129	−156
1,020	−183	−210	−238	−265	−292	−319	−346	−373	−400	−427
1,030	−454	−481	−508	−535	−562	−589	−615	−642	−669	−696
1,040	−722	−749	−776	−803	−830	−856	−883	−909	−936	−963
1,050	−989	−1,015	−1,042	−1,069	−1,095	−1,121	−1,148	−1,174	−1,200	−1,226
1,060	−1,253	−1,278	−1,304	−1,331	−1,357	−1,384	−1,410	−1,437	−1,463	−1,490
1,070	−1,516	------	------	------	------	------	------	------	------	------

TABLE IV—ALTITUDE-PRESSURE-TEMPERATURE TABLE

Altitude, feet	Pressure		Temperature, ° C.	Mean temperature, ° C.	Altitude, feet	Pressure		Temperature, ° C.	Mean temperature, ° C.
	in. Hg	mm Hg				in. Hg	mm Hg		
−1,000	31.02	787.9	17.0	16.0	32,500	7.91	201.0	−49.4	−18.6
−500	30.47	773.8	16.0	15.5	33,000	7.73	196.4	−50.4	−19.1
0	29.921	760.0	15.0	15.0	33,500	7.55	191.8	−51.4	−19.6
500	29.38	746.4	14.0	14.5	34,000	7.38	187.4	−52.4	−20.2
1,000	28.86	732.9	13.0	14.0	34,500	7.20	183.0	−53.4	−20.7
1,500	28.33	719.7	12.0	13.0	35,000	7.04	178.7	−54.3	−21.3
2,000	27.82	706.6	11.0	13.5	35,332	6.93	175.9	−55.0	−21.6
2,500	27.31	693.8	10.0	12.0	35,500	6.87	174.5	−55.0	−21.8
3,000	26.81	681.1	9.1	12.5	36,000	6.71	170.4	−55.0	−22.3
3,500	26.32	668.6	8.1	11.0	36,500	6.55	166.4	−55.0	−22.8
4,000	25.84	656.3	7.1	11.5	37,000	6.39	162.4	−55.0	−23.3
4,500	25.36	644.2	6.1	10.0	37,500	6.24	158.6	−55.0	−23.8
5,000	24.89	632.3	5.1	10.5	38,000	6.10	154.9	−55.0	−24.3
5,500	24.43	620.6	4.1	9.5	38,500	5.95	151.2	−55.0	−24.8
6,000	23.98	609.0	3.1	9.0	39,000	5.81	147.6	−55.0	−25.2
6,500	23.53	597.6	2.1	8.5	39,500	5.68	144.1	−55.0	−25.6
7,000	23.09	586.4	1.1	8.0	40,000	5.54	140.7	−55.0	−26.0
7,500	22.65	575.3	0.1	7.5	40,500	5.41	137.4	−55.0	−26.4
8,000	22.22	564.4	−0.8	7.0	41,000	5.28	134.2	−55.0	−26.8
8,500	21.80	553.7	−1.8	6.5	41,500	5.16	131.0	−55.0	−27.2
9,000	21.38	543.2	−2.8	6.0	42,000	5.04	127.9	−55.0	−27.6
9,500	20.98	532.8	−3.8	5.5	42,500	4.92	124.9	−55.0	−28.0
10,000	20.58	522.6	−4.8	5.0	43,000	4.80	122.0	−55.0	−28.3
10,500	20.18	512.5	−5.8	4.5	43,500	4.69	119.1	−55.0	−28.6
11,000	19.79	502.6	−6.8	4.0	44,000	4.58	116.3	−55.0	−29.0
11,500	19.40	492.8	−7.8	3.5	44,500	4.47	113.5	−55.0	−29.3
12,000	19.03	483.3	−8.8	2.9	45,000	4.36	110.8	−55.0	−29.6
12,500	18.65	473.8	−9.8	2.4	45,500	4.26	108.2	−55.0	−29.9
13,000	18.29	464.5	−10.8	1.9	46,000	4.16	105.7	−55.0	−30.2
13,500	17.93	455.4	−11.7	1.4	46,500	4.06	103.2	−55.0	−30.5
14,000	17.57	446.4	−12.7	0.9	47,000	3.97	100.7	−55.0	−30.8
14,500	17.22	437.5	−13.7	0.4	47,500	3.873	98.38	−55.0	−31.1
15,000	16.88	428.8	−14.7	−0.1	48,000	3.781	96.05	−55.0	−31.4
15,500	16.54	420.2	−15.7	−0.6	48,500	3.693	93.70	−55.0	−31.7
16,000	16.21	411.8	−16.7	−1.2	49,000	3.605	91.57	−55.0	−31.9
16,500	15.89	403.5	−17.7	−1.7	49,500	3.520	89.41	−55.0	−32.2
17,000	15.56	395.3	−18.7	−2.2	50,000	3.436	87.30	−55.0	−32.4
17,500	15.25	387.3	−19.7	−2.7	51,000	3.276	83.22	−55	------
18,000	14.94	379.4	−20.7	−3.2	52,000	3.124	79.34	−55	------
18,500	14.63	371.7	−21.7	−3.7	53,000	2.978	75.64	−55	------
19,000	14.33	364.0	−22.6	−4.3	54,000	2.839	72.12	−55	------
19,500	14.04	356.5	−23.6	−4.8	55,000	2.707	68.76	−55	------
20,000	13.75	349.1	−24.6	−5.3	56,000	2.581	65.55	−55	------
20,500	13.46	341.9	−25.6	−5.6	57,000	2.460	62.49	−55	------
21,000	13.18	334.7	−26.6	−6.3	58,000	2.346	59.58	−55	------
21,500	12.90	327.7	−27.6	−6.9	59,000	2.236	56.80	−55	------
22,000	12.63	320.8	−28.6	−7.4	60,000	2.132	54.16	−55	------
22,500	12.36	314.1	−29.6	−7.9	61,000	2.033	51.63	−55	------
23,000	12.10	307.4	−30.6	−8.4	62,000	1.938	49.22	−55	------
23,500	11.84	300.9	−31.6	−9.0	63,000	1.847	46.92	−55	------
24,000	11.59	294.4	−32.5	−9.5	64,000	1.761	44.73	−55	------
24,500	11.34	288.1	−33.5	−10.0	65,000	1.679	42.65	−55	------
25,000	11.10	281.9	−34.5	−10.5	66,000	1.601	40.66	−55	------
25,500	10.86	275.8	−35.5	−11.1	67,000	1.526	38.76	−55	------
26,000	10.62	269.8	−36.5	−11.6	68,000	1.455	36.95	−55	------
26,500	10.39	263.9	−37.5	−12.1	69,000	1.387	35.23	−55	------
27,000	10.16	258.1	−38.5	−12.7	70,000	1.322	33.59	−55	------
27,500	9.94	252.5	−39.5	−13.2	71,000	1.261	32.02	−55	------
28,000	9.72	246.9	−40.5	−13.7	72,000	1.202	30.53	−55	------
28,500	9.50	241.4	−41.5	−14.3	73,000	1.146	29.10	−55	------
29,000	9.29	236.0	−42.5	−14.8	74,000	1.093	27.75	−55	------
29,500	9.08	230.7	−43.4	−15.3	75,000	1.041	26.45	−55	------
30,000	8.88	225.6	−44.4	−15.9	76,000	0.993	25.22	−55	------
30,500	8.68	220.5	−45.4	−16.4	77,000	0.946	24.04	−55	------
31,000	8.48	215.5	−46.4	−16.9	78,000	9.902	22.92	−55	------
31,500	8.29	210.6	−47.4	−17.5	79,000	0.860	21.85	−55	------
32,000	8.10	205.8	−48.4	−18.0	80,000	0.820	20.83	−55	------

(2) *Application.* (i) Sensitive altimeters complying with the specifications appearing in this section are hereby approved for all aircraft. Sensitive altimeters already approved by the Administrator may continue to be installed in aircraft:

(*a*) For which an application for original type certificate is made prior to the effective date of this section,

(*b*) The prototype of which is flown within one year after the effective date of this section, and

(*c*) The prototype of which is not flown within one year after the effective date of this section if due to causes beyond the applicant's control.

(ii) If an alteration involving a change in type or model of sensitive altimeters is made within nine months after the effective date of this section, previously approved types of sensitive altimeters may be installed. However, in any such change made after the nine-month period, new types of sensitive altimeters installed in aircraft used in instrument flights shall meet the specifications contained herein.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, each sensitive altimeter shall be permanently marked with the Technical Standard Order designation, CAA–TSO, C10a, to identify the altimeter as meeting the requirements of this section in accordance with the manufacturers' statement of conformance outlined in subparagraph (5) of this paragraph. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for sensitive altimeters have been met.

(2) *Data requirements.* None.

(3) *Effective date.* After March 1, 1949, specifications contained in this section will constitute the basis for Civil Aeronautics Administration approval of sensitive altimeters for use in certificated aircraft used in instrument flight.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this section; which affect the basic airworthiness of the component, should be submitted for approval by the Chief, Aircraft Division, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest Regional Office of the Civil Aeronautics Administration, Attention: Chief, Aircraft Division.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Division, Attention: W–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the sensitive altimeter to be produced by him meets the minimum safety requirements established in this section. Immediately thereafter, distribution of the sensitive altimeter conforming with the terms of this section may be started and continued.

(ii) The prescribed identification on the sensitive altimeter does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the sensitive altimeter in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this section are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Office, Washington 25, D. C.

§ 514.11 *Technical Standard Order C11a: "Fire Detectors"*—(a) *Introduction.* (1) Under section 601 of the Civil Aeronautics Act of 1938, as amended, and Parts 4a and 4b of this title issued pursuant thereto, the Administrator of Civil Aeronautics is authorized to adopt standards for fire detectors intended for use in civil aircraft. In adopting these standards, consideration has been given to existing Government and industry standards for fire detectors.

(b) *Directive*—(1) *Provision*—(i) *Requirements established.* The requirements for fire detectors, as set forth in SAE Specification AS 401a, Fire and Heat Detectors, revised October 1, 1949,[1] stated below, with the exceptions noted in subdivision (ii) of this subparagraph, are hereby established as minimum safety standards for fire detectors intended for use in civil aircraft.

1. *Purpose.* To specify minimum requirements for fire and heat detection instruments for use in aircraft, the operation of which may subject the instrument to environmental conditions specified in section 3.4.

2. *Scope.* This specification covers the following basic types of instruments, or combinations thereof, intended for use in protecting aircraft power plant installations, auxiliary power plants, combustion heaters and other installation where fuel, oil or similar fires may occur.

Type I. Rate of temperature rise.
Type II. Flame.
Type III. Fixed temperature.

3. *General requirements.*

3.1 *Materials and workmanship.*

3.1.1 *Materials.* Materials shall be of a quality which experience and/or tests have demonstrated to be suitable and dependable for use in aircraft instruments.

3.1.2 *Workmanship.* Workmanship shall be consistent with high-grade aircraft instrument manufacturing practice.

3.2 *Radio interference.* The instrument shall not be the source of objectionable interference, under operating conditions at any frequencies used on aircraft, either by radiation of feed-back, in radio sets installed in the same aircraft as the instrument.

3.3 *Identification.* The following information shall be legibly and permanently marked on the instrument or attached thereto:

(a) Name of instrument.
(b) SAE Spec. AS–401.
(c) Rating (electrical, vacuum, etc.).
(d) Alarm temperature (sensing element, where applicable).
(e) Manufacturer's part number.
(f) Manufacturer's serial number or date of manufacture.
(g) Manufacturer's name and/or trademark.

3.4 *Environmental conditions.* The following conditions have been established as design criteria only. Tests shall be conducted as specified in sections 5, 6 and 7.

3.4.1 *Temperature.* When mounted in accordance with the manufacturer's recommendations, the unit shall function over the range of ambient temperatures shown in column A below and shall not be adversely affected by exposure to the temperatures shown in column B below:

Instrument location	A	B
Power plant compartments.	−20 to 130 C.	−65 to 130 C.
Other areas	−20 to 70 C.	−65 to 70 C.

3.4.2 *Humidity.* The instrument shall function and not be adversely affected by exposure to a relative humidity of up to and including 95% at a temperature of approximately 32° C.

3.4.3 *Altitude.* The instrument shall function and shall not be adversely affected when subjected to a pressure and temperature range equivalent to −1,000 feet to +40,000 feet standard altitude.

3.4.4 *Vibration.* When mounted in accordance with the instrument manufacturer's instructions, the units shall function and shall not be adversely affected when subjected to the following vibrations at a frequency of 500 to 3,000 cycles per minute. When specified by the purchaser for use in rotary wing aircraft, the frequency range shall be 150 to 3,000 cycles per minute.

Type of instrument mounting	Amplitude (inch)	Acceleration
Structurally mounted instruments	0.030	3.8 g.
Engine compartment mounted instruments.	.20	25 g.

It is understood that the instrument shall withstand vibration at higher frequencies, but the acceleration values need not exceed those shown above.

4. *Detail requirements.*

4.1 *Indicating method.* The instrument shall be capable of actuating both visual and aural alarm indicators.

4.2 *Reliability.* False signals in the instrument shall not result from variations in voltage between 0 and 125% of the rated, flight attitude, dust and accelerations encountered in flight or landing.

4.3 *Integrity test provisions.* The instrument shall permit testing of the continuity of the associated electrical circuit in flight.

4.4 *Calibration adjustment.* All calibration adjustments in the instrument shall be provided with tamper-proof seals.

5. *Test conditions.*

5.1 *Atmospheric conditions.* Unless otherwise specified, all tests required by this specification shall be conducted at an atmospheric pressure of approximately 29.92 inches of mercury and at an ambient temperature of approximately 22° C. When tests are conducted with the atmospheric pressure or the temperature substantially different from these values, allowance shall be made for the variations from the specified conditions.

5.2 *Vibration (To minimize friction).* Unless otherwise specified, all tests for performance may be made with the instrument subjected to a vibration of 0.002 to 0.005 inch amplitude at a frequency of 1500 to 2000 cycles per minute. The term amplitude as used herein indicates the total displacement from positive maximum to negative maximum.

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West 39th St., New York, N. Y.

5.3 *Vibration stand.* A vibration stand shall be used which will vibrate at any desired frequency between 500 and 3000 cycles per minute and shall subject the instrument to vibration such that a point on the instrument will describe, in a plane inclined 45 degrees to the horizontal plane, a circle, the diameter of which is equal to the amplitude specified herein.

5.4 *Test position.* Unless otherwise specified, the instrument shall be mounted and tested in its normal operation position.

5.5 *Power conditions.* Unless otherwise specified, all tests shall be conducted at the power rating recommended by the manufacturer and the instrument shall be in an operating condition.

5.6 *Flame temperature measurement and flame size.* All flame temperatures shall be measured by using an 18 gauge wire thermocouple and the two strands of wire shall be twisted together for a distance of ½ inch from the thermocouple bead. The thermocouple bead shall be at the center of the flame and the two wires leading to the bead shall be parallel and extend radially into the flame. The nature and size of the flame and the method of test shall be specified in Figure 2.

5.7 *Test sample.* Unless otherwise specified, when qualification tests are being conducted on continuous type detectors, at least eight inches of the continuous detecting element shall be subjected to the test conditions as well as at least two typical insulators, supports, or connectors of each basic type used.

6. *Individual performance tests.* All instruments or components of such shall be subjected to whatever tests the manufacturer deems necessary to demonstrate specific compliance with this specification.

6.1 *Response time.* The sensing element shall be tested as specified in section 7.1, or in some equivalent manner which will adequately check the sensitivity and calibration.

6.2 *Dielectric.* The instrument shall be subjected to whichever one of the following dielectric tests is most applicable:

6.2.1 Ungrounded instruments, or grounded instruments prior to connection of internal ground wire, shall be tested by either the method of section 6.2.1.1 or 6.2.1.2.

6.2.1.1 *Insulation resistance.* The insulation resistance measured at 500 volts d-c between all electrical circuits connected together and the metallic case shall not be less than 20 megohms.

6.2.1.2 *Dielectric strength.* The insulation shall withstand without evidence of damage the application of a sinusoidal voltage at a commercial frequency between all electrical circuits connected together and the metallic case, for a period of 5 seconds. The RMS value of the sinusoidal voltage applied shall be either five (5) times the maximum instrument operating voltage, or 500 volts, whichever is the greater.

6.2.2 Instruments operated with a permanent internal ground connection shall be tested as follows:

The insulation shall withstand without evidence of damage the application of a sinusoidal voltage at a commercial frequency between each electric circuit and the metallic case, for a period of 5 seconds. The RMS value of the sinusoidal voltage applied shall be 1.25 times the maximum circuit operating voltage obtainable between two test points.

7. *Qualification tests.* As many instruments as appear necessary to demonstrate that all instruments will comply with the requirements of this section shall be subjected to the following tests where applicable. The tests on each instrument shall be conducted consecutively and after the tests have been initiated, no further adjustments of the instrument shall be permitted. There shall be no false alarms signalled during any of the tests. A response time test per section 7.1 shall be conducted after each qualification test, except sections 7.1.1, 7.2, 7.3, 7.3.1, 7.3.2, 7.3.3 and 7.14. However, except in the case of the response time test following the qualification test of section 7.14, the instrument subjected to the response time test need not be the same instrument or instruments being subjected to the entire series of qualification tests.

7.1 *Response time.* The sensing element shall be tested in an 815° C maximum temperature flame as specified in Figure 2. The ambient temperature from which the test is started shall be normal room temperature. However, a higher starting ambient temperature may be used if the sensing element is specified for use only in locations where the ambient temperature will not, under any normal continuous operating conditions, fall below this value. For types of detectors and detector systems whose sensitivity is affected by the number of sensing elements, by the length of the sensing element exposed to flame (for continuous types), or by other factors which may be varied from one system design to another, all response time tests shall be conducted with the least sensitive system configuration to be used. The time of response shall not exceed 5 seconds when the instrument is tested in accordance with this section.

7.1.1 *Repeat response time.* The sensing element(s) of the fire detector system shall be subjected to an 815° C flame for a period of one minute. It shall then be removed from the flame. Within 5 seconds after the alarm has cleared the sensing element shall again be subjected to the flame. An alarm shall be signalled in five seconds. The units subjected to this test need not be subjected to any other tests.

7.2 *Fixed temperature operation.* (For Type III instruments only). The detecting element shall be placed in a suitable heating chamber and the temperature shall be raised at the rate of not less than 7 C per minute, to not less than 80% of the rated temperature setting. The temperature shall be maintained at this value for not less than one hour. The temperature shall then be raised, at a rate of not more than 7 C per minute, to 10% above the rated temperature setting. An alarm shall be signalled within a tolerance of 10% of the rated temperature setting. The temperature shall then be lowered, at a rate of not more than 7 C per minute. The alarm indication shall cease before the temperature falls below 90% of the rated setting.

7.3 *False alarm due to rate of temperature rise.* No alarm shall be signalled during these tests except in the case of Type III

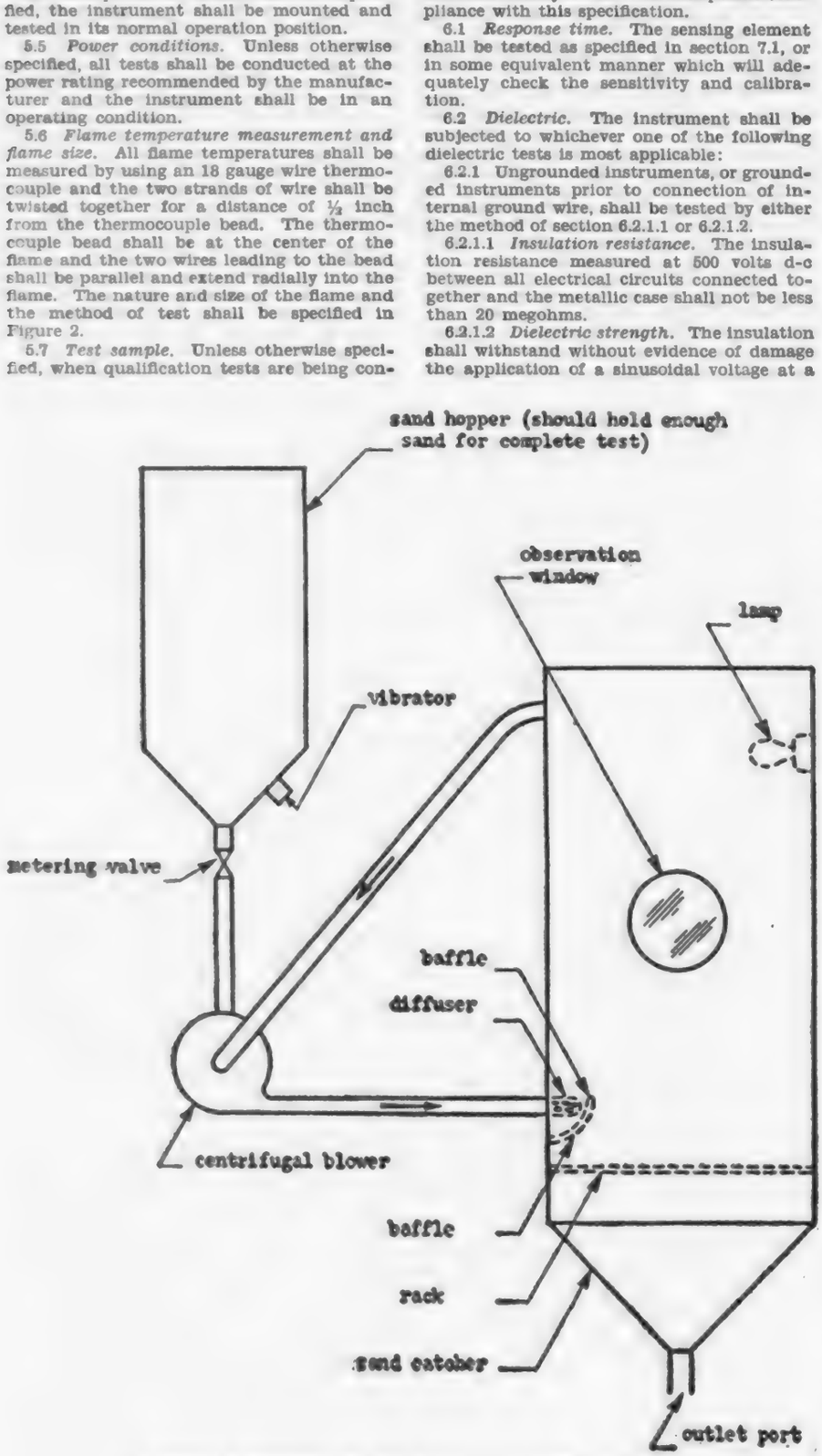

FIGURE 1. Schematic Sand Test Arrangement (Ref. sec. 7.9).

instruments which may signal an alarm when the temperature reaches a value not less than 90% of the rated setting. For types of detectors and detector systems whose sensitivity is affected by the number of sensing elements, the length of the sensing element exposed to the test temperature (for continuous types), or by other factors which may be varied from one system design to another, the tests of 7.3.1 and 7.3.2 shall be conducted with the most sensitive system configuration to be used.

7.3.1 *False alarm due to local temperature rise.* The sensing element shall be subjected to various combinations of rates of temperature rise and durations of these rates of rise. Except as indicated in section 7.3, no alarm shall be signalled when the element is exposed to any combination of the rates of rise and durations within the shaded area in Figure 3 (a). This test shall be conducted in a manner simulating conditions due to local overheating.

7.3.2 *False alarm due to general temperature rise.* The test of 7.3.1 shall be repeated except that Figure 3 (b) shall be employed and the test shall be conducted in a manner simulating conditions existing due to a general temperature rise throughout an engine compartment where the sensing element(s) may be located.

7.3.3 *False clearing of alarm due to partial extinguishing of fire.* The system configuration specified in 7.3 shall be subjected to an 815° C flame for 30 seconds. The flame shall then be removed from all except the portion of the system as specified in 7.1. The alarm shall not clear. After an additional 30 seconds the flame shall be removed entirely and the alarm shall then clear. The units subjected to this test need not be subjected to any other test.

7.4 *Vibration.* The instrument shall be mounted on a vibration stand, in its own shock mounted base, if provided with one, in its normal operating plane. The instrument shall be subjected to vibration with an amplitude between .003 and .005 inch at frequencies for 500 to 3000 cycles per minute, in order to determine whether the natural frequency of the instrument occurs in this frequency range.

7.5 *Vibration endurance.* With the instrument mounted on a vibration stand, per section 7.4, it shall be vibrated continuously at a total amplitude as specified in section 3.4.4 for a period of 24 hours at the natural frequency, if applicable, as determined in section 7.4, or if not applicable, at a frequency of 2000 cycles per minute. No damage shall be evident after this test. In the case of this test, the response time test of 7.1.1 shall be conducted while the instrument is being vibrated. However, the sensing and indicating elements need not be vibrated simultaneously unless it is apparent that simultaneous vibration will be critical.

7.6 *Water spray.* All parts of the instrument which may be installed in exposed portions of the airplane shall be subjected to the following tests.

7.6.1 *Simulated rain.* The components being tested shall be subjected to a spray of water, to simulate rain, for a period of three hours. The detector shall not be dried prior to testing per section 7.1.

7.6.2 *Salt spray.* The components being tested shall be subjected to spray with a 20% sodium chloride solution for a period of fifteen minutes. The components shall then be dried in air at room temperature before they are tested per section 7.1. The components shall not be cleaned before the test of section 7.1 is conducted.

7.7 *Corrosion.* All parts of the instrument which may be installed in exposed portions of the airplane shall be subjected to a finely atomized spray of 20% sodium chloride solution for 200 hours. At the end of this period the parts shall be allowed to dry and may then be cleaned prior to conducting the test per section 7.1.

7.8 *Fuel and oil immersion.* All parts of the instrument which may be located in engine compartments, or other locations where they may be contaminated by fuel or oil, shall be subjected to the following tests.

7.8.1 *Fuel immersion.* The components being tested shall be thoroughly immersed in normally leaded 100 octane fuel at approximately room temperature and then allowed to drain for one minute before being tested per section 7.1. No cleaning other than the drainage specified above shall be accomplished prior to conducting subsequent tests.

7.8.2 *Oil immersion.* The same test shall be conducted with used SAE #60 oil.

7.9 *Sand.* All parts of the instrument which may be installed in exposed portions of the airplane (such as in nacelles, wheel wells, etc.) shall be subjected to a sand or dust laden air stream, flowing at a constant rate of 2½ pounds per hour, for four hours. The stream shall be formed of sand or dust that has been sifted through a 150 mesh screen and shall pass over all parts of the units under test. The test chamber shall be equivalent to that shown in Figure 1.

7.10 *High temperature.* All components of the instrument which may be located in engine compartments shall be exposed to a temperature of 130° C for 48 hours prior to being tested per section 7.1 except a 130 C. All other components shall be subjected to a similar test at 70° C.

7.11 *Low temperature.* The instrument shall be exposed to a temperature of −65° C for a period of 24 hours, after which it shall be raised to a temperature of −55° C for a period of six hours prior to being tested per Section 6.1 except at −55° C. However, compliance with section 7.1 shall be considered to have been accomplished in this case if the time of response does not exceed 10 seconds.

7.12 *Altitude effects.*

7.12.1 *High altitude and rate of climb.* The instrument shall be subjected to a pressure that is varied from normal atmospheric pressure to an altitude pressure equivalent to 40,000 feet at a rate of not less than 3000 feet per minute. The instrument shall be maintained at the altitude pressure equivalent to 40,000 feet for a period of 48 hours. The instrument shall then be returned to sea level conditions and then tested per section 7.1. Sealed units shall not leak as a result of exposure to this pressure. Where applicable, this shall be demonstrated by immersion in water after the test.

7.12.2 *Low altitude.* The instrument shall be subjected to the same test as outlined in section 7.12.1, except that the rate of pressure variation need not be as specified therein and the pressure shall be maintained

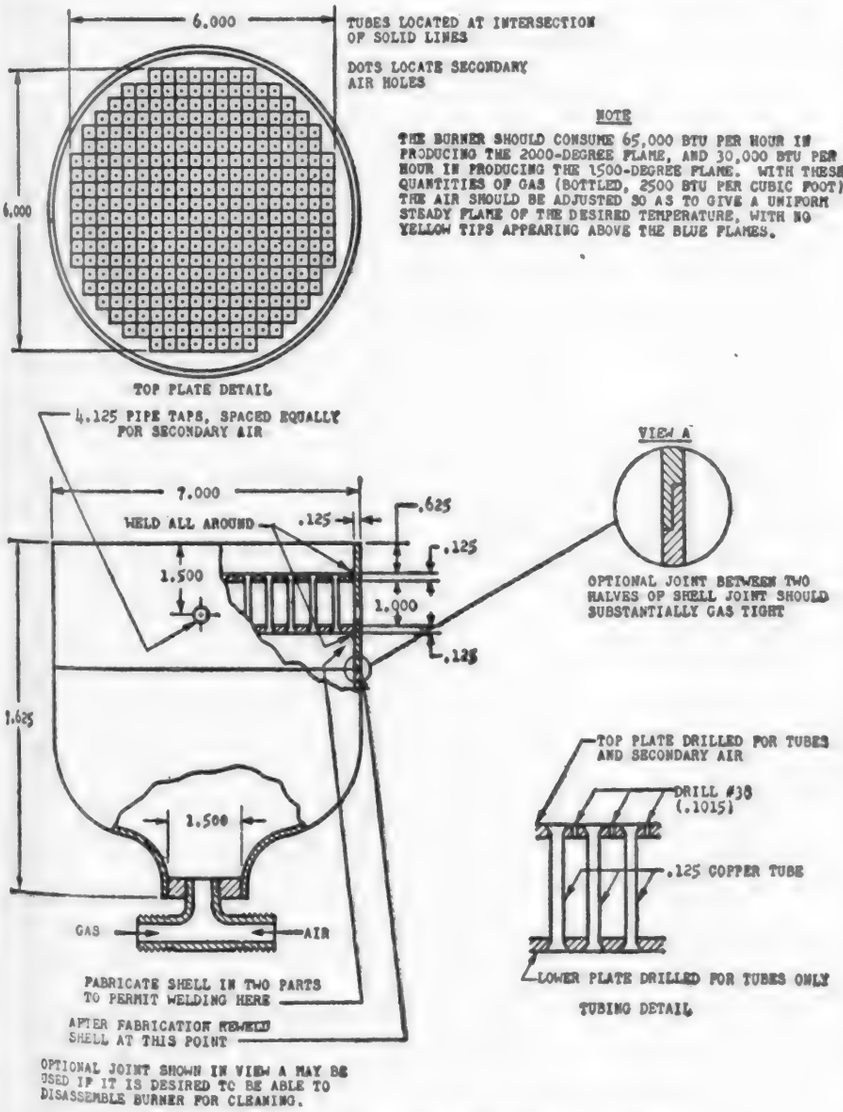
6.000
TUBES LOCATED AT INTERSECTION OF SOLID LINES
DOTS LOCATE SECONDARY AIR HOLES
NOTE
THE BURNER SHOULD CONSUME 65,000 BTU PER HOUR IN PRODUCING THE 2000-DEGREE FLAME, AND 30,000 BTU PER HOUR IN PRODUCING THE 1500-DEGREE FLAME. WITH THESE QUANTITIES OF GAS (BOTTLED, 2500 BTU PER CUBIC FOOT), THE AIR SHOULD BE ADJUSTED SO AS TO GIVE A UNIFORM STEADY FLAME OF THE DESIRED TEMPERATURE, WITH NO YELLOW TIPS APPEARING ABOVE THE BLUE FLAMES.
6.000
TOP PLATE DETAIL
4.125 PIPE TAPS, SPACED EQUALLY FOR SECONDARY AIR
7.000
WELD ALL AROUND
.125
.625
.125
1.500
1.000
.125
1.625
1.500
GAS
AIR
FABRICATE SHELL IN TWO PARTS TO PERMIT WELDING HERE
AFTER FABRICATION WELD SHELL AT THIS POINT
OPTIONAL JOINT SHOWN IN VIEW A MAY BE USED IF IT IS DESIRED TO BE ABLE TO DISASSEMBLE BURNER FOR CLEANING.
VIEW A
OPTIONAL JOINT BETWEEN TWO HALVES OF SHELL JOINT SHOULD SUBSTANTIALLY GAS TIGHT
TOP PLATE DRILLED FOR TUBES AND SECONDARY AIR
DRILL #38 (.1015)
.125 COPPER TUBE
LOWER PLATE DRILLED FOR TUBES ONLY
TUBING DETAIL

FIGURE 2—Flame Test Burner (Ref. sec. 5.6, 7.1 and 7.14).

at an altitude pressure equivalent to −1000 feet.

7.12.3 *Pressurization test.* All components of the instrument which may be located in pressurized area shall be subjected to an external pressure of 8 p. s. i. for a period of fifteen minutes. The response time test of 7.1.1 shall be conducted while the components involved are under the 8 p. s. i. pressure.

7.13 *Voltage variation.* The instrument shall be operated with the voltage varying from 110% to 75% of the rated. The instrument shall then be tested per section 6.1 under these conditions. Compliance with the provisions of section 4.2 shall also be demonstrated.

7.14 *Flame.* The detecting element of the instrument shall be subjected to a completely enveloping flame at a temperature of 1100° C minimum for two periods of one minute each. The flame shall be as specified in Figure 2. The instrument shall be cooled to approximately room temperature or to the ambient temperature permitted in section 7.2 after each exposure to flame. The instrument shall then be exposed to the same flame a third time. An alarm shall be signalled in not more than five seconds after each exposure to flame. During cooling of the instrument after the first two exposures to flame the alarm shall clear in not more than 45 seconds after the flame has been removed in the first two cases. Artificial means of cooling the instrument shall not be used until after the alarm has cleared. A manual resetting device may be used to clear the alarm provided it is demonstrated that the resetting device will clear the alarm only if the flame has been removed; i. e., if flame is still present and the manual resetting device is operated, the instrument must continue to indicate the presence of a fire. The instrument need not clear the alarm and need not be capable of further operation after the third exposure to flame. During this test the sensing element shall be subjected to vibration as specified in section 7.5.

(ii) *Exceptions.* Item (b) of section 3.3 "Identification" need not be complied with for conformance with the terms of this section.

(2) *Application.* (i) Fire detectors complying with the specifications appearing in this section are hereby approved for all aircraft. Fire detectors already approved by the Administrator may continue to be installed in aircraft:

(*a*) For which an application for original type certificate is made prior to the effective date of this section,

(*b*) The prototype of which is flown within one year after the effective date of this section, and

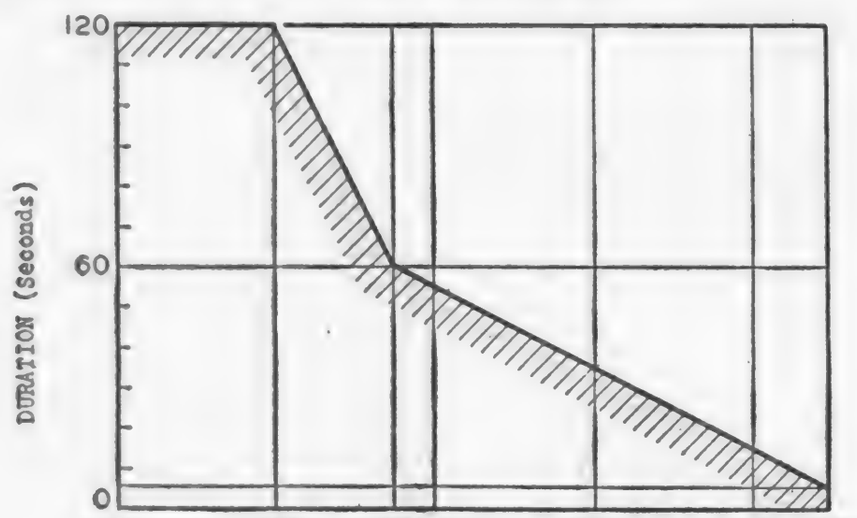

FIGURE 3 (a)—Local temperature rise condition (Ref. sec. 7.3.1).

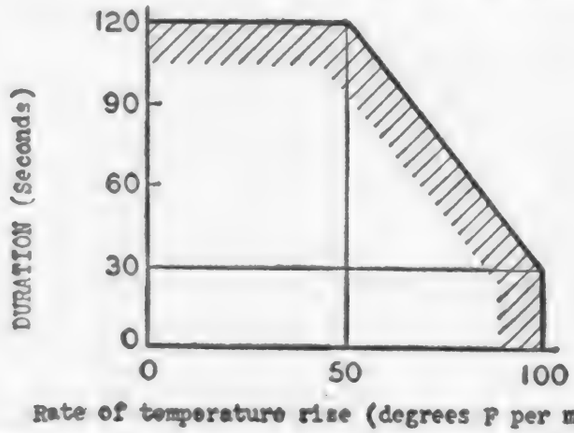

FIGURE 3 (b)—General temperature rise condition (Ref. sec. 7.3.2).

(*c*) The prototype of which is not flown within one year after the effective date of this section if due to causes beyond the applicant's control.

If an alteration or replacement involving a change in type or model of fire detector is made within nine months after the effective date of this section, previously approved types of fire detectors may be installed. However, in any such change made after the nine-month period, new types of fire detectors installed shall meet the specifications contained herein.

(c) *Specific instructions*—(1) *Marking.* (i) In addition to the identification information required in the referenced specification (see "Exceptions" in paragraph (b) (ii) of this section," each fire detector shall be permanently marked with the Technical Standard Order designation, CAA–TSO–C11a, to identify the fire detector as meeting the requirements of this section in accordance with the manufacturers' statement of conformance outlined in subparagraph (5) of this paragraph. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for fire detectors have been met.

(2) *Data requirements.* (i) Ten copies of the following technical information shall be submitted by the manufacturer of the fire detector with his statement of conformance to the Civil Aeronautics Administration, Aircraft Division, Attention: W–298, Washington 25, D. C. These data shall consist of all information such as descriptive data, drawings, diagrams, etc., which are necessary to define the limitations of use for which the fire detectors are satisfactory, and which are essential to outline the conditions for their proper installation and operation. They shall include at least the following, wherever applicable, in addition to other limitations which may apply:

(*a*) Maximum allowable normal ambient temperature at the point of detector location.

(*b*) Maximum allowable rate of temperature rise at point of detector location as a result of normal operation.

(*c*) Electrical circuit arrangement.

(*d*) Operating voltage.

(*e*) Mounting or support method.

(*f*) Maximum or minimum number of units or detector length which can be used in one circuit or one fire zone without adversely affecting sensitivity or causing false indications due to temperature variations associated with normal operation.

(3) *Effective date.* (i) After August 1, 1948, specifications contained in this section will constitute the basis for Civil Aeronautics Administration approval of fire detectors for use in certificated aircraft.

(4) *Deviations.* (i) Requests for deviation from, or waiver of, the requirements of this section, which affect the basic airworthiness of the component, should be submitted for approval by the Chief, Aircraft Division, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest Regional Office

of the Civil Aeronautics Administration, Attention: Chief, Aircraft Division.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Division, Attention: W–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the fire detector to be produced by him meets the minimum safety requirements established in this section. Immediately thereafter, distribution of the fire detector conforming with the terms of this section may be started and continued.

(ii) The prescribed identification on the fire detector does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the fire detector in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this section are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Office, Washington 25, D. C.

§ 514.12 *Technical Standard Order C12: "Life Rafts"*—(a) *Introduction.* (1) Life rafts are in the class of aircraft components which the Administrator of Civil Aeronautics is authorized to approve in accordance with Parts 3, 4a, 4b, and 6 of this title.

(2) This Technical Standard Order is intended to serve as a criterion by which the product manufacturer can obtain Civil Aeronautics Administration approval of his life raft.

(3) In the establishment of this Technical Standard Order, consideration has been given to existing Government and industry standards for life rafts for the purpose of adopting the performance requirements of one of the recognized aeronautical standards as the minimum safety requirements for life rafts which are intended for use in civil aircraft. The specification of the National Aircraft Standards Committee for life rafts contains such requirements.

(b) *Directive*—(1) *Provision.* Pursuant to Parts 3, 4a, 4b, and 6 of this title, which authorize the Administrator to approve aircraft equipment, including life rafts, the performance requirements for life rafts as set forth in National Aircraft Standards Specification NAS 800, Airline Life Rafts, dated November 19, 1947[1] stated below, are hereby established as minimum safety requirements for life rafts which are intended for use in civil aircraft:

1. *Applicable specifications.*

1.1 The following specifications shall by references hereinafter noted form a part of this specification.

[1] Copies may be obtained from the American Aeronautical Forum, 506 Washington Loan and Trust Building, Washington 4, D. C.

1.1.1 *U. S. Army Specifications.* U. S. Army Spec. 94–40420A Raft, Pneumatic Type A–3A.

2. *Type and grade.*

2.1 This specification covers minimum performance and safety requirements for all types of airline life rafts suitable for commercial transoceanic use.

3. *Materials and workmanship.*

3.1 *Fabric material.* Rubberized fabric used in the construction of the air tubes shall have the following physical characteristics:

Tensile strength (Grab Test) Warp 190 lbs. per inch (Min.). Filler 190 lbs. per inch (Min.).

Tear (Trapezoidal Method): 12 x 12 lbs. per inch (Min.).

Permeability: 10 liters/24 hrs. (Max.).

The ply or coat adhesion of the fabric shall not be less than 3.5 lbs. per square inch. Fabrics used in bottoms, canopy, spray shield, etc., shall be suitable for the purpose intended.

3.2 *Protection.* All metal parts shall be corrosion resistant or suitably protected against corrosion. All cotton material, ropes and twine shall be mildew proofed.

4. *Detail requirement.*

4.1 *Design and construction.*

4.1.1 *Shape.* The raft shall be circular in shape.

4.1.2 *Size.* The following dimensions shall determine the size of raft:

10 man—Inside diameter of raft: 6 ft. 6 in.

15 man—Inside diameter of raft: 8 ft.

20 man—Inside diameter of raft: 10 ft.

4.1.3 *Number of tubes.* The raft shall have two identical air tubes, one superimposed on the other.

4.1.4 *Floor.* The raft shall have a center type floor (suspended from between tubes), with manually inflated blister on each side in the center.

4.1.5 *Buoyancy.* The minimum buoyancy per person shall be 250 pounds, based on the two tubes only (disregarding the buoyancy derived from the floor or the inflatable floor support). Minimum free-board shall be 12 inches for all rafts herein considered, utilizing buoyancy of the complete raft allowing 165 pounds per person. Not less than 85% of each tube should be CO_2 inflated (boarding station tubes are manually inflated with air).

4.1.6 *Inflation.* Both tubes inflated by CO_2 equipment to a pressure of not less than 1 psi and not more than 1½ psi at a corrected temperature of 70° F. and at corrected standard atmospheric pressure. Inflation equipment shall be located on outside periphery of raft. The CO_2 release mechanism shall be suitably identified and protected by a conspicuous warning flap or tab which must be unfastened to permit actuation of the release device. Arrangement shall be such that failure of one tube or manifold will not allow loss of gas in second tube. Any manifold system shall permit equal distribution of gas to the individual tubes. No sealing material which will harden or obstruct the gas passage shall be used.

4.1.7 *Bulkheads.* None required except at boarding stations.

4.1.8 *Boarding stations.* One boarding station shall be provided in each tube and shall consist of a section of tube (minimum length of 30") to be manually inflated from either side of raft. Locations of boarding stations shall not impair rigidity of raft.

4.1.9 *Boarding handles.* Boarding handles shall be suitably located at each boarding station to best assist persons entering the raft from the water. They shall be designed to withstand a pull of 250 lbs. per handle.

4.1.10 *Life line.* A life line of webbing, ¼ inch cotton rope (or equivalent), shall encircle the raft on the outside periphery. It shall be usable with the raft floating either side up. It shall be attached to the raft at intervals by means of knots at the webbing loops (or equivalent).

4.1.11 *Manual inflation valves.* Shall be located so as to permit pump inflation of both tubes from either side. Must not interfere with occupant comfort.

4.1.12 *Color.* All exposed surfaces shall be yellow, conforming to Shade No. 120 of Supplement to Specification #3–1 (U. S. Army Spec. Ref. Sect. E–2 of Spec. #94,-40420A) or superior high visibility color.

4.2 *Accessory equipment.*

4.2.1 *Raft lanyard.* A suitable lanyard of not less than 5/16" diameter cotton rope (or equivalent) with a minimum length of 20 feet shall be provided. One end shall be attached to the raft at tube intersection with the rest of the line held coiled (or looped) at that point. Provision shall be made for attaching the loose end of the lanyard to the outside of the carrying case or container so that the lanyard may be secured to the plane when the raft is put overboard.

4.2.2 *Sea anchor.* A 16" diameter sea anchor shall be provided suitably attached to 25 feet of 3/16" cotton braided line (or equivalent). A point of attachment of suitable strength (not less than 250 lbs.) for the attachment of a sea anchor shall be provided on the tube intersection line diametrically opposite the point of attachment of the raft lanyard.

4.2.3 *Heaving line.* One heaving line (British type or equivalent) shall be located on the outside periphery of the raft so as to be accessible from either side. It shall be mounted near one of the boarding stations. The heaving line and ring shall be designed so as to float on the surface of the water.

4.2.4 *Canopy.* An overall cover shall be provided leaving provisions for opening for two-way cross-ventilation. It shall be easily detachable from periphery of raft. It shall be attached to the periphery of the raft in such a manner as to be usable from either side. Provisions shall be made for supporting the canopy above the heads of the occupants. Material should be light weight, waterproof, non-odorous, and of same color as raft. A closable outlet shall be provided at the center of the canopy to permit controlled trapping of rain water by raft occupants if desired.

4.2.5 *Paddles.* Two paddles, each in two sections, and each 4 feet long (when assembled) shall be provided. The paddles shall be in accordance with or equal to the latest revision of applicable Army or Navy Specifications for Oars; Sectional (Aircraft Use) insofar as materials, strength, general design and finish are concerned. The paddles shall be attached to the raft with suitable rope to prevent loss and stowed to permit easy access and compact raft packing.

4.2.6 *Inflation pump.* The pump shall be in accordance with or equal to the latest revision of the applicable Army-Navy Specification for Pumps; Hand Air, insofar as materials, strength, general design and finish are concerned. One pump shall be provided, tied with suitable rope to raft to prevent loss. Stowage shall permit easy access and compact raft packing.

4.2.7 *Accessory case tie-downs.* Provisions shall be made on each side of the floor at center of raft for tie-downs to hold the accessory case. Each tie-down shall be capable of withstanding a pull of 250 pounds.

4.3 *Marking instructions.*

4.3.1 *Raft identification.* Each raft shall be legibly and permanently marked with the following information:

a. Manufacturer's Name.

b. Manufacturer's Model and Serial Number.

c. National Aircraft Standard Number (NAS 800).

4.3.2 *Placarding instructions.* Suitable placarding in waterproof black ink (or equivalent) shall denote use and location of raft

equipment. Placarding shall take into account possible occupancy of either side of raft as well as persons boarding raft from water.

4.4 *Tests.*

4.4.1 *Pressure test.* Rafts shall withstand an inflation pressure of 6 psi for not more than 10 minutes when new. This test is a check on workmanship, design and seam construction and shall be applied at the manufacturer's plant to occasional rafts selected at random or as otherwise directed by the purchaser.

4.4.2 *Leakage test.* All rafts shall be inflated through the manifold to 2 psi and left for 24 hours. The pressure shall not drop below 1 psi at the end of 24 hours with suitable correction for temperature changes. This test is to be made at the manufacturer's plant.

5. *Notes.*

5.1 The requirements of this specification are based upon Air Transport Association (ATA) Life Raft Recommendation 1–B.

(2) *Application.* (i) Life rafts complying with the specifications appearing in this Technical Standard Order are hereby approved for all aircraft. Life rafts already approved by the Administrator may continue to be installed in aircraft:

(*a*) For which an application for original type certificate is made prior to the effective date of this order,

(*b*) The prototype of which is flown within 1 year after the effective date of this order, and

(*c*) The prototype of which is not flown within 1 year after the effective date of this order if due to causes beyond the applicant's control.

(ii) If a major change is made in the installation within 9 months after the effective date of this order involving a change in type or model of life raft, previously approved types of life rafts may be installed. However, in any such change made after the 9-month period, new types of life rafts installed in aircraft engaged in over-water operations shall meet the specifications contained in this section.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, each life raft shall be permanently marked with the Technical Standard Order designation, "CAA–TSO–C12," to identify the life raft as meeting the requirements of this order in accordance with the manufacturer's statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for life rafts have been met.

(2) *Data requirements.* None.

(3) *Effective date.* After August 1, 1948, specifications contained in this order will constitute the basis for Civil Aeronautics Administration approval of life rafts for use in certificated aircraft engaged in over-water operations.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Director, Aircraft Service, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest regional office of the Civil Aeronautics Administration, Attn: Superintendent, Aircraft Branch.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Service, Attn: A–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the life rafts to be produced by him meet the minimum safety requirements established in this order. The statement of conformance should specify which size life rafts are being produced. Immediately thereafter distribution of the life raft conforming with the terms of this order may be started and continued.

(ii) The prescribed identification on the life raft does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the life raft in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Staff, Washington 25, D. C.

§ 514.13 *Technical Standard Order C13: "Life Preservers"*—(a) *Introduction.* (1) Life preservers are in the class of aircraft components which the Administrator of Civil Aeronautics is authorized to approve in accordance with Parts 3, 4a, 4b, and 6 of this title.

(2) This Technical Standard Order is intended to service as a criterion by which the product manufacturer can obtain Civil Aeronautics Administration approval of his life preserver.

(3) In the establishment of this Technical Standard Order, consideration has been given to existing Government and industry standards for life preservers for the purpose of adopting the performance requirements of one of the recognized aeronautical standards as the minimum safety requirements for life preservers which are intended for use in civil aircraft. The specification of the National Aircraft Standards Committee for life preservers contains such requirements.

(b) *Directive*—(1) *Provision.* Pursuant to Parts 3, 4a, 4b and 6 of this title, which authorize the Administrator to approve aircraft equipment, including life preservers, the performance requirements for life preservers as set forth in National Aircraft Standards Specification NAS 801, Airline Life Vests, dated November 19, 1947,[1] stated below, are hereby established as minimum safety requirements for life preservers which are intended for use in civil aircraft:

[1] Copies may be obtained from the American Aeronautical Forum, 506 Washington Loan and Trust Building, Washington 4, D. C.

1. *Applicable specifications.*

1.1 None.

2. *Type and grade.*

2.1 This specification covers minimum performance and safety requirements for all types of airline life vests suitable for commercial transoceanic use.

3. *Materials and workmanship.*

3.1 *Finished fabric.* The finished fabric shall have physical characteristics as follows:

Tensile str. (Grab test)—200×180 #/in. (Min.).

Permeability—10 liters/sq. m./24 hrs. (Max.).

3.2 *Life.* Rubberized fabrics used shall be reasonably soft for long life storage in folded condition when stored under dark, cool, and dry conditions with temperature variations not to exceed 120° F. max. and minus 10° F. min. for a maximum of 1000 hours and an average of 80° F. for a total life storage of two years.

3.3 *Protection.* All metal parts shall be corrosion resistant or suitably protected against corrosion. All cotton material, ropes and twine shall be mildew proofed.

4. *Detail requirements.*

4.1 *Design and construction.*

4.1.1 *Compartmentation.* The life vest shall have a minimum of two airtight compartments and shall be designed in such a way that any of these compartments when properly inflated will support the wearer in the proper flotation attitude.

4.1.2 *Inflation.* At least two compartments shall be separately inflated by a CO_2 cartridge contained in a suitable puncture type device. Each compartment shall have an oral inflation valve, unless the vest is designed in such a manner that oral inflation in one compartment completely supplements the buoyancy of the other compartments in which event only the oral inflation compartment need have an oral inflation valve. The oral inflation valve must be so placed as to be in an easily accessible position.

4.1.3 *Buoyancy.* The design of the life vest should be such that the buoyancy with CO_2 inflation be a minimum of 20 pounds and the additional buoyancy developed by topping up with air should provide a total buoyancy of the vest of 25 pounds.

4.1.4 *Flotation attitude.* Vest shall support wearer in a reasonably upright position, face up (not more than a 45° angle from vertical). It shall be impossible to stay in a face down position. The vest shall be self-righting.

4.1.5 *Donning vest.* Vest shall be easily donned and comfortably worn. It shall be capable of being donned by the wearer alone. Inflated vest shall be proof against slipping off the wearer but it shall not have straps which pass between the wearer's legs. It shall not chafe the wearer's neck unduly, nor shall it choke him uncomfortably when inflated.

4.1.6 *Fastening or attachment.* The means of attachment of the vest by straps or fasteners shall be conveniently located and easily operated by the wearer. Consideration shall be given to operation of fastening means under conditions of darkness and low temperature.

4.1.7 *Color.* Color shall be high visibility yellow.

4.2 *Marking and instructions.*

4.2.1 *Vest identification.* Each vest shall be legibly and permanently marked with the following information:

a) Manufacturer's Name.

b) Manufacturer's Model and Serial No.

c) National Aircraft Standard No. (NAS 801).

4.2.2 *Placarding instructions.* The vest shall be suitably marked with the words "TOP—FRONT" placed in the proper location to identify the correct wearing position. Instructions shall also be placed on each vest to identify inflation devices and their means of operation.

4.3 *Tests.*

4.3.1 *Pressure test.* Each compartment must withstand without failure a pressure of 10 lbs./sq. in. for 5 minutes when new.

4.3.2 *Leakage test.* No loss of rigidity shall be noted after each compartment of the vest has been inflated to 2 p. s. i. and hung on a rack for 12 hours. Each compartment shall be tested for leakage.

(2) *Application.* (i) Life preservers complying with the specifications appearing in this Technical Standard Order are hereby approved for all aircraft. Life preservers already approved by the Administrator may continue to be installed in aircraft:

(*a*) For which an application for original type certificate is made prior to the effective date of this order,

(*b*) The prototype of which is flown within 1 year after the effective date of this order, and

(*c*) The prototype of which is not flown within 1 year after the effective date of this order if due to causes beyond the applicant's control.

(ii) If a major change is made in the installation within 9 months after the effective date of this order involving a change in type or model of life preservers, previously approved types of life preservers may be installed. However, in any such change made after the 9-month period, new types of life preservers installed in aircraft engaged in overwater operations shall meet the specifications contained in this section.

(c) *Specific instructions.*—(1) *Marking.* In addition to the identification information required in the referenced specification, each life preserver shall be permanently marked with the Technical Standard Order designated "CAA-TSO-C13" to identify the life preserver as meeting the requirements of this order in accordance with the manufacturer's statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for life preservers have been met.

(2) *Data requirements.* None.

(3) *Effective date.* After August 1, 1948, specifications contained in this order will constitute the basis for Civil Aeronautics Administration approval of life preservers for use in certificated aircraft engaged in overwater operations.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Director, Aircraft Service, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest regional office of the Civil Aeronautics Administration, Attn: Superintendent, Aircraft Branch.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Service, Attn: A-298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the life preserver to be produced by him meets the minimum safety requirements established in this order. Immediately thereafter distribution of the life preserver conforming with the terms of this order may be started and continued.

(ii) The prescribed identification on the life preserver does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the life preserver in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If the complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Staff, Washington 25, D. C.

§ 514.14 *Technical Standard Order C14: "Aircraft Fabric, 'Intermediate' Grade, External Covering Material"*—(a) *Introduction.* (1) Aircraft fabric is in the class of aircraft components which the Administrator of Civil Aeronautics is authorized to approve in accordance with Parts 3, 4a, 4b, and 6 of this title.

(2) This Technical Standard Order is intended to serve as a criterion by which the product manufacture can obtain Civil Aeronautics Administration approval of his aircraft fabric.

(3) In the establishment of this Technical Standard Order, consideration has been given to existing Government and industry standards for aircraft fabric for the purpose of adopting the performance requirements of one of the recognized aeronautical standards as the minimum safety requirements for "intermediate" grade fabric which is intended for use as external covering material on civil aircraft or components thereof. The specifications of the Society of Automotive Engineers for "intermediate" grade fabric contains such requirements.

(b) *Directive*—(1) *Provision.* Pursuant to Parts 3, 4a, 4b and 6 of this title, which authorize the Administrator to approve aircraft material, the performance requirements for "intermediate" grade fabric as set forth in section 5 of SAE Specification AMS 3804, Cloth; Airplane, Cotton, Mercerized, dated January 1, 1946,[1] stated below, are hereby established as the minimum safety requirements for "intermediate" grade fabric which is intended for external use on civil aircraft:

1. *Acknowledgment.* A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.

2. *Application.* The cloth shall be suitable for covering aircraft surfaces such as wings, fuselage, allerons, and elevators.

3. *Material.* The cloth shall be woven from 1- or 2-ply, combed cotton yarn.

4. *Quality.* (a) The cotton fibers shall be evenly spun into yarns of proper and uniform yarn count, twist, and diameter to produce the texture and weight required.

(b) The yarn shall be reasonably free from nap breaks, broken ends, uneven threads and knots.

(c) Yarns shall be closely woven into fabric uniform in body and appearance, and which shall be reasonably free from striations due to variable weaving operations. Cloth shall be uniformly finished in accordance with the best practice for high-grade airplane cloth.

5. *Requirements.* (a) The cloth shall be piece mercerized, or the yarn may be mercerized under tension.

(b) The weave shall be plain (one up and one down).

(c) The number of threads shall be not more than 94 and not less than 80 per inch in either the warp or the fill.

(d) The selvage edges shall be flat woven with no greater tension than that of the body of the cloth.

(e) The breaking strength shall be not less than 65 pounds per inch of width in either the warp or fill as determined by the ravelled-strip method.

(f) The elongation shall be not greater than 13% in the warp and not greater than 11% in the fill when 57 pounds tension is applied during the ravelled-strip test.

(g) The tearing strength shall be not less than 4 pounds in either the warp or fill as determined by the trapezoid method.

(h) The weight of the finished cloth shall not exceed 4 ounces per square yard.

(i) The cloth shall contain not more than 2.5% total sizing, finishing and other non-fibrous materials and should be chemically neutral. A desizing operation may be performed if necessary to reduce the sizing content to the 2.5% maximum value specified.

(j) Finishing shall consist of washing, framing and calendering. The calendering shall be sufficient to lay any nap present and shall provide a smooth, even surface. Nap may be removed by singeing.

6. *Tests.* All tests shall be made in accordance with ASTM D39-39 except as follows: The test for total sizing, finishing and other non-fibrous materials shall be made in accordance with ASTM D629-42T, using equation 3 for calculation.

7. *Tolerances.* Unless otherwise specified on the drawing or purchase order, the following tolerances apply:

Width (inches):	*Tolerance (inches)*
36	±½
42	±⅝
60	±1
69	±1
90	±1½

8. *Length of cut.* The length of a single cut shall be not less than 40 yards except that 10% of the total yardage of one width under any contract or order may be in short lengths of from 10 to 25 yards and 10% may be from 25 to 40 yards. However, short lengths shall be rolled together and the roll properly labeled to indicate that it is composed of short lengths.

9. *Length of rolls.* The cloth shall be furnished on rolls containing the following lengths:

Width (inches):	*Roll lengths (yards)*
36 and 42	500 to 600
60 and 69	250 to 300
90	175 to 200

10. *Reports.* Unless otherwise specified, the vendor shall furnish for each shipment three copies of a notarized report stating that the cloth conforms to this specification. This report shall include the purchase order number, material specification number and quantity.

11. *Identification.* The cloth shall incorporate a continuous marking to show the manufacturer's name or trade-mark and AMS 3804. This marking may be stamped along the selvage.

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West Thirty-ninth Street, New York, N. Y.

12. *Packaging.* (a) Packaging shall be accomplished in such a manner as to insure that the cloth, during shipment or storage, will be protected against exposure to moisture or weathering, or harmful agents of any kind.

(b) Each package shall be permanently and legibly marked to give the following information:

Cloth: airplane, cotton, mercerized, 65 lbs. Breaking Strength AMS 3804
Yardage _____
Width _____
Date of manufacture _____
Order number _____
Manufacturer's name _____

13. *Approval.* A vendor shall not supply cloth to this specification until samples are approved by the purchaser and, after approval, the materials and/or methods of manufacture shall not be changed without written permission from the purchaser. Results of tests on incoming shipments shall be essentially equal to those on the approved samples.

14. *Rejections.* Cloth not conforming to this specification or to authorized modifications shall be subject to rejection. Unless otherwise stipulated, rejected cloth will be returned to vendor at vendor's expense, unless purchaser receives, within three weeks of notification of rejection, other instructions for disposition.

NOTE: *Similar specification.* ANC–121 is listed for information only and shall not be construed as an acceptable alternate unless all requirements of this AMS are met.

(2) *Application.* Fabric complying with the specifications appearing in this order is approved for all aircraft with wing loadings of less than 9 pounds per square foot and placard never-exceed speeds of less than 160 miles per hour. Fabric already approved by the Administrator may continue to be installed on aircraft:

(i) For which an application for original type certificate is made prior to the effective date of this order.

(ii) The prototype of which is flown within 1 year after the effective date of this order, and

(iii) The prototype of which is not flown within 1 year after the effective date of this order if due to causes beyond the applicant's control.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, the Technical Standard Order designation "CAA–TSO–C14" shall be marked continuously along the selvage edge of the cloth, except that for the purposes of this order, inclusion of the AMS number 3804 is not required. This will identify the fabric as meeting the requirements of this order in accordance with the manufacturer's statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for aircraft fabric have been met.

(2) *Data requirements.* None.

(3) *Effective date.* After September 1, 1948, specifications contained in this Technical Standard Order will constitute the basis for Civil Aeronautics Administration approval of "intermediate" grade fabric for use on certificated aircraft.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Director, Aircraft Service, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest regional office of the Civil Aeronautics Administration, Attn: Superintendent, Aircraft Branch.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Service, Attn: A–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the "intermediate" grade fabric to be manufactured by him meets the minimum safety requirements established in this order. Immediately thereafter, distribution of the aircraft fabric conforming to the terms of this order may be started and continued.

(ii) The prescribed identification on the aircraft fabric does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the aircraft fabric on his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration. Aviation Information Staff, Washington 25, D. C.

§ 514.15 *Technical Standard Order C15: "Aircraft Fabric, Grade 'A,' External Covering Material"*—(a) *Introduction.* (1) Aircraft fabric is in the class of aircraft components which the Administrator of Civil Aeronautics is authorized to approve in accordance with Parts 3, 4a, 4b, and 6 of this title.

(2) This Technical Standard Order is intended to serve as a criterion by which the product manufacturer can obtain Civil Aeronautics Administration approval of his aircraft fabric.

(3) In the establishment of this Technical Standard Order, consideration has been given to existing Government and industry standards for aircraft fabric for the purpose of adopting the performance requirements of one of the recognized aeronautical standards as the minimum safety requirements for Grade "A" fabric which is intended for use as external covering material on civil aircraft or components thereof. The specifications of the Society of Automotive Engineers for Grade "A" fabric contains such requirements.

(b) *Directive*—(1) *Provision.* Pursuant to Parts 3, 4a, 4b and 6 of this title, which authorize the Administrator to approve aircraft material, the performance requirements for Grade "A" fabric as set forth in section 5 of SAE Specification AMS 3806, Cloth; Airplane, Cotton, Mercerized, dated January 1, 1946,[1] stated below, are hereby established as the minimum safety requirements for Grade "A" fabric which is intended for external use on civil aircraft.

1. *Acknowledgment.* A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.

2. *Application.* The cloth shall be suitable for covering aircraft surfaces such as wings, fuselage, ailerons, and elevators.

3. *Material.* The cloth shall be woven from 2-ply, combed cotton yarn.

4. *Quality.* (a) The cotton fibers shall be evenly spun into yarns of proper and uniform yard count, twist, and diameter to produce the texture and weight required.

(b) The yarn shall be reasonably free from nap breaks, broken ends, uneven threads and knots.

(c) Yarns shall be closely woven into fabric uniform in body and appearance, and which shall be reasonably free from striations due to variable weaving operations. Cloth shall be uniformly finished in accordance with the best practice for high-grade airplane cloth.

5. *Requirements.* (a) The cloth shall be piece mercerized, or the yarn may be mercerized under tension.

(b) The weave shall be plain (one up and one down).

(c) The number of threads shall be not more than 84 and not less than 80 per inch in either the warp or the fill.

(d) The selvage edges shall be flat woven with no greater tension than that of the body of the cloth.

(e) The breaking strength shall be not less than 80 pounds per inch of width in either the warp or fill as determined by the ravelled-strip method.

(f) The elongation shall be not greater than 13% in the warp and not greater than 11% in the fill when 70 pounds tension is applied during the ravelled-strip test.

(g) The tearing strength shall be not less than 5 pounds in either the warp or fill as determined by the trapezoid method.

(h) The weight of the finished cloth shall not exceed 4.0 ounces per square yard for 36 and 42 inch widths and 4.5 ounces per square yard for 60 inches and over.

(i) The cloth shall contain not more than 2.5% total sizing, finishing and other non-fibrous materials and should be chemically neutral. A desizing operation may be performed if necessary to reduce the sizing content to the 2.5% maximum value specified.

(j) Finishing shall consist of washing, framing and calendering. The calendering shall be sufficient to lay any nap present and shall provide a smooth, even surface. Nap may be removed by singeing.

6. *Tests.* All tests shall be made in accordance with ASTM D39–39 except as follows: The test for total sizing, finishing and other non-fibrous materials shall be made in accordance with ASTM D629–42T, using equation 3 for calculation.

7. *Tolerances.* Unless otherwise specified on the drawing or purchase order, the following tolerances apply:

Width (inches):	*Tolerance (inches)*
36	±½
42	±⅝
60	±1
69	±1
90	±1½

8. *Length of cut.* The length of a single cut shall be not less than 40 yards except

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West Thirty-ninth Street, New York, N. Y.

that 10% of the total yardage of one width under any contract or order may be in short lengths of from 10 to 25 yards and 10% may be from 25 to 40 yards. However, short lengths shall be rolled together and the roll properly labeled to indicate that it is composed of short lengths.

9. *Length of roll.* The cloth shall be furnished on rolls containing the following lengths:

Width (inches):	*Roll length (yards)*
36 and 42	500 to 600
60 and 69	250 to 300
90	175 to 200

10. *Reports.* Unless otherwise specified, the vendor shall furnish for each shipment three copies of a notarized report stating that the cloth conforms to this specification. This report shall include the purchase order number, material specification number and quantity.

11. *Identification.* The cloth shall incorporate a continuous marking to show the manufacturer's name or trade-mark and AMS 3806. This marking may be stamped along the selvage.

12. *Packaging.* (a) Packaging shall be accomplished in such a manner as to insure that the cloth, during shipment or storage, will be protected against exposure to moisture or weathering, or harmful agents of any kind.

(b) Each package shall be permanently and legibly marked to give the following information:

Cloth: airplane, cotton, mercerized, 80 lbs. Breaking Strength AMS 3806
Yardage _____
Width _____
Date of Manufacture _____
Order number _____
Manufacturer's name _____

13. *Approval.* A vendor shall not supply cloth to this specification until samples are approved by the purchaser and, after approval, the materials and/or methods of manufacture shall not be changed without written permission from the purchaser. Results of tests on incoming shipments shall be essentially equal to those on the approved samples.

14. *Rejections.* Cloth not conforming to this specification or to authorized modifications shall be subject to rejection. Unless otherwise stipulated, rejected cloth will be returned to vendor at vendor's expense, unless purchaser receives, within three weeks of notification of rejection, other instructions for disposition.

NOTE: *Similar specification.* ANC–121 is listed for information only and shall not be construed as an acceptable alternate unless all requirements of this AMS are met.

(2) *Application.* Fabric complying with the specifications appearing in this order is approved for all aircraft with wing loadings greater than 9 pounds per square foot and placard never-exceed speeds greater than 160 miles per hour. Fabric already approved by the Administrator may continue to be installed on aircraft:

(i) For which an application for original type certificate is made prior to the effective date of this order.

(ii) The prototype of which is flown within 1 year after the effective date of this order, and

(iii) The prototype of which is not flown within 1 year after the effective date of this order if due to causes beyond the applicant's control.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, the Technical Standard Order designation "CAA–TSO–C15" shall be marked continuously along the selvage edge of the cloth, except that for the purposes of this order, inclusion of the AMS number 3806 is not required. This will identify the fabric as meeting the requirements of this order in accordance with the manufacturer's statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for aircraft fabric have been met.

(2) *Data requirements.* None.

(3) *Effective date.* After September 1, 1948, specifications contained in this Technical Standard Order will constitute the basis for Civil Aeronautics Administration approval of Grade "A" fabric for use on certificated aircraft.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Director, Aircraft Service, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest regional office of the Civil Aeronautics Administration, Attn: Superintendent, Aircraft Branch.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Service, Attn: A–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the Grade "A" aircraft fabric to be manufactured by him meets the minimum safety requirements established in this order. Immediately thereafter, distribution of the aircraft fabric conforming to the terms of this order may be started and continued.

(ii) The prescribed identification on the aircraft fabric does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the aircraft fabric on his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Staff, Washington 25, D. C.

§ 514.16 *Technical Standard Order C16: "Air-Speed Tubes (Electrically Heated)"*—(a) *Introduction.* (1) Electrically heated air-speed tubes are in the class of aircraft components which the Administrator of Civil Aeronautics is authorized to approve in accordance with Parts 4a and 4b of this title.

(2) This Technical Standard Order is intended to serve as a criterion by which the product manufacturer can obtain Civil Aeronautics Administration approval of his electrically heated air-speed tube.

(3) In the establishment of this Technical Standard Order, consideration has been given to existing Government and industry standards for air-speed tubes for the purpose of adopting the performance requirements of one of the recognized aeronautical standards as the minimum safety requirements for air-speed tubes which are intended for use in civil aircraft. The specification of the Society of Automotive Engineers for electrically heated air-speed tubes contains such requirements.

(b) *Directive*—(1) *Provision.* Pursuant to Parts 4a and 4b of this title, which authorize the Administrator to approve aircraft equipment, the performance requirement for air-speed tubes as set forth in sections 5 and 6 of SAE Specification AS–393, Air-Speed Tubes, Electrically Heated, dated December 1, 1947,[1] stated below, are hereby established as minimum safety requirements for electrically heated air-speed tubes which are intended for use in civil aircraft.

1. *Purpose.* To specify minimum requirements for Electrically Heated Air-Speed Tubes for use on aircraft the operation of which may subject the instrument to environmental conditions specified in section 3.4.

2. *Scope.* This specification covers the following basic types:

Type I. Pitot Pressure, Straight and L-shaped, 12 and 24 volt nominal, 2 wire circuit.

Type II. Pitot and Static Pressures, Straight and L-shaped 12 and 24 volt nominal, 2 wire circuit.

3. *General requirements.*

3.1 *Materials and workmanship.*

3.1.1 *Materials.* Materials shall be of a quality which experience and/or tests have demonstrated to be suitable and dependable for the purpose intended.

3.1.2 *Workmanship.* Workmanship shall be consistent with high grade instrument manufacturing practice.

3.2 *Radio interference.* The instrument shall not be the source of objectionable interference under operating conditions at any frequencies used on aircraft, either by radiation or feedback, in radio sets installed in the same aircraft as the instrument.

3.3 *Identification.* The following information shall be legibly and permanently marked on the units or attached thereto:

a. Name of instrument.
b. SAE Spec. AS 393.
c. Rating (Nominal Voltage).
d. Manufacturer's Part No.
e. Manufacturer's Serial No. or date of manufacture.
f. Manufacturer's name and/or trademark.

3.4 *Environmental conditions.* The following conditions have been established as design criteria only. Tests shall be conducted as specified in sections 5, 6, 7.

3.4.1 *Temperature.* When the instruments are mounted in accordance with manufacturer's instructions, they shall function over the range of ambient temperatures of −65° C to +70° C and shall not be adversely affected by exposure to temperatures of −65° C to +70° C.

3.4.2 *Vibration.* When the instruments are mounted in accordance with the manufacturer's instructions, they shall function

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West Thirty-ninth Street, New York, N. Y.

and shall not be adversely affected when subjected to the following vibration:

Frequency: 500–3,000 cycles per minute.
Amplitude: 0.250 inch.
Maximum Acceleration: 32.5 g.

NOTE: It is understood that the unit shall withstand vibration at higher frequencies but the acceleration value need not exceed that shown above.

When specified by the purchaser for use in rotary wing aircraft, the frequency range shall be 150–3,000 cycles per minute.

4. *Detail requirements.*

4.1 *Drainage.* The tube shall be designed to provide maximum drainage of water, resulting from rain or melting ice, consistent with maintaining the calibration specified in sections 6.3, 6.4 and 6.5.

4.2 *Marking.* Pilot pressure and static pressure lines shall be identified by the letters P and S, respectively, stamped, etched, engraved or otherwise permanently marked on the lines or fittings. The top of the tube shall be identified.

5. *Individual performance tests.* All instruments shall be subjected to whatever tests the manufacturer deems necessary to demonstrate specific compliance with the specification including the following requirements, where applicable.

5.1 *Leakage.* With a pressure of 10 inches of mercury applied separately to the pitot pressure and/or the static pressure lines, there shall be no evidence of leakage when the corresponding pitot or static pressure openings and drain holes are sealed.

5.2 *Dielectric.* The insulation shall withstand without evidence of damage the application of a sinusoidal voltage at a commercial frequency between the terminals of the heater circuit and the shell (case) for a period of 5 seconds. The R. M. S. value of the sinusoidal voltage applied shall be 500 volts.

5.3 *Heater operation.* When mounted in its normal position, the tube shall be tested for heater operation by applying the minimum rated voltage (12 or 24 volts) for a period of 2 minutes. The power consumption at that time shall be within ±30 percent of the power consumption at rated voltage.

6. *Qualification tests.* As many instruments as deemed necessary to demonstrate that all instruments will comply with the requirements of this section shall be tested in accordance with the manufacturer's recommendations, where applicable.

6.1 *Vibration.* The tubes shall be subjected to vibration for three hour periods in each of the three perpendicular reference planes such that a point on the tip of the tubes will oscillate ¼ inch. The test shall be conducted such that each period of three hours shall consist of one hour at 1,000, 2,000 and 3,000 cycles per minute. Rated voltage shall be applied to the terminals continuously during this test. Ambient temperature shall be 20° to 30° C. There shall be no failure of any kind.

6.2 *Endurance.* The tubes shall be made to operate continuously in still air at 15 or 30 volts (as applicable) for, at least, five hours. Ambient temperature shall be 70° C. There shall be no damage of any kind except discoloration, which will not affect corrosion resistance.

6.3 *Calibration at zero angle of attack.* The tube shall be mounted in a wind tunnel in line with the airflow and tested separately for pitot pressure and for static pressure at the values for air speeds specified in table I. The test shall be made by comparison with the results obtained under similar conditions with a calibrated tube. The error of the tube expressed in terms of indicated air speed shall not exceed 1 percent of the indication or 1 MPH, whichever is greater, and the static pressure shall be within the tolerances specified in table I.

TABLE I—PERMISSIBLE ERRORS IN STATIC PRESSURE

Indicated air speed m. p. h.:	*Tolerance inches of water*
50	0.10
75	.15
100	.20
125	.25
150	.30
175	.35
200	.40
225	.45
250	.50

6.4 *Calibration at various angles of attack.* The tube shall be tested as specified for "Error at Zero Angle of Attack" at approximately 125 MPH except that the angle of attack shall be varied by 2-degree intervals from +16 to −10 degrees inclusive. The indicated error expressed in terms of indicated air speed shall not differ from the indicated error at zero angle of attack by more than 3 miles per hour, and the error in static pressure shall not differ from the static pressure at zero angle of attack by more than 0.20 inch of water.

6.5 *Calibration at various angles of yaw.* The tube shall be tested as specified in section 6.3 at approximately 125 MPH except that the angle of yaw shall be varied between plus and minus five degrees. The indicated error expressed in terms of indicated air speed shall not differ from the error at zero angle of yaw by more than 3 miles per hour and the error in static pressure shall not differ from the static pressure at zero angle of yaw by more than 0.20 inch of water.

6.6 *Magnetic effect.* The magnetic effect of the tube shall be determined in terms of the deflection of a free magnet approximately 1½ inches long in a magnetic field with a horizontal intensity of 0.18±0.01 gauss, when the tube is held in various positions and with rated voltage applied on an east-west line with its nearest part five inches from the center of the magnet. (An aircraft Compass with the compensating magnets removed therefrom may be used as the free magnet for this test.) The Maximum deflection of the magnet shall not exceed 5 degrees for any pointer deflection.

6.7 *De-icing.* The tube shall be tested in an icing wind tunnel at a temperature of −10° to −20° C. and at an indicated tunnel air speed of 200 miles per hour. When the tube is coated with ¼ inch of ice at the nose, the minimum rated voltage shall be applied to the terminals. The time required to clear the ice cap shall not be more than 2 minutes after the potential is applied. No re-icing shall occur.

6.8 *Cold resistance.* The tube shall be subjected to a temperature of −65° C. or colder for a minimum period of 48 hours. There shall be no evidence of damage. After this test, the tube shall be capable of successfully passing all tests described heretofore.

(2) *Application.* (i) Air-speed tubes complying with the specifications appearing in this Technical Standard Order are hereby approved for all aircraft. Air-speed tubes already approved by the Administrator may continue to be installed in aircraft:

(*a*) For which an application for original type certificate is made prior to the effective date of this order,

(*b*) The prototype of which is flown within 1 year after the effective date of this order, and

(*c*) The prototype of which is not flown within 1 year after the effective date of this order if due to causes beyond the applicant's control.

(ii) If a major change is made in the installation within 9 months after the effective date of this order involving a change in type or model of air-speed tube, previously approved types of air-speed tubes may be installed. However, in any such change made after the 9-month period, new types of air-speed tubes installed in aircraft used in instrument flight shall meet the specifications contained in this section.

(c) *Specific instructions.*—(1) *Marking.* In addition to the identification information required in the referenced specification, each air-speed tube shall be permanently marked with the Technical Standard Order designation "CAA-TSO–C16" to identify the air-speed tube as meeting the requirements of this order in accordance with the manufacturer's statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for air-speed tubes have been met.

(2) *Data requirements.* None.

(3) *Effective date.* After September 1, 1948, specifications contained in this Technical Standard Order will constitute the basis for Civil Aeronautics Administration approval of air-speed tubes for use in certificated aircraft used in instrument flight.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Director, Aircraft Service, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest regional office of the Civil Aeronautics Administration, Attn: Superintendent, Aircraft Branch.

(5) *Conformance.* (i) The manufacturer shall furnish to the CAA, Aircraft Service, A–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the air-speed tube to be produced by him meets the minimum safety requirements established in this order. Immediately thereafter distribution of the air-speed tube conforming with the terms of this order may be started and continued.

(ii) The prescribed identification on the air-speed tubes does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the air-speed tube in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Staff, Washington 25, D. C.

§ 514.17 *Technical Standard Order C17: "Fire-Resistant Aircraft Material".*—(a) *Introduction.* (1) Fire-re-

sistant aircraft material is in the class of aircraft components which the Administrator of Civil Aeronautics is authorized to approve in accordance with Parts 3, 4a, 4b and 6 of this title.

(2) This Technical Standard Order is intended to serve as a criterion by which the product manufacturer can obtain Civil Aeronautics Administration approval of his fire-resistant aircraft material.

(3) In the establishment of this Technical Standard Order, consideration has been given to existing Government and industry standards for fire-resistant aircraft material for the purpose of adopting the performance requirements of one of the recognized aeronautical standards as the minimum safety requirements for fire-resistant materials which are intended for use in civil aircraft. The specification of the Society of Automotive Engineers for fire-resistant aircraft materials contains such requirements.

(b) *Directive*—(1) *Provision.* Pursuant to Parts 3, 4a, 4b and 6 of this title, which authorize the Administrator to approve aircraft material, the performance requirements for fire-resistant aircraft material as set forth in section 3 of SAE Specification AMS–3851, Fire-Resistant Properties for Aircraft Materials, dated May 1, 1948,[1] stated below, are hereby established as minimum safety requirements for fire-resistant material which is intended for use in civil aircraft.

1. *Acknowledgment.* A vendor shall mention his specification number in all quotations and when acknowledging purchase orders.

2. *Application.* Primarily intended to cover materials which may be used without further treatment in areas in air carrier aircraft where a fire-resistant material is required.

3. *Technical requirements.* The material as supplied shall be capable of meeting the following test:

If the material is rigid an 8 x 8 in. specimen shall be used. If flexible, the material shall be placed in a frame, exposing an area 8 x 8 in. Where backing material is used, the specimen shall be provided with the same backing. The test specimen shall be supported at an angle of 45 degrees. The Bunsen or Tirrill burner shall rest upon a horizontal surface. The burner shall be adjusted for no air intake, giving a yellow tipped, 1½ in. flame. Suitable precautions shall be taken to avoid drafts. The period of application shall be 30 sec with ⅓ of the flame in contact with the material at the approximate center of the specimen. Upon removal of the flame source from the specimen, the flame shall extinguish itself within 15 sec and no smoldering or glowing shall be visible 10 sec thereafter. No complete penetration of the material shall result.

4. *Reports.* Unless otherwise specified, the vendor shall furnish, with the original sample submitted for approval, three copies of a notarized report of the results of the test noted above showing duration of flaming, time of smoldering, char width, and penetration. After approval, unless otherwise specified, vendor shall furnish with each shipment three copies of a notarized report of the results of the above test made on each grade or type of each lot or shipment of material contained in the order. This report shall include the purchase order number, this specification number, vendor's material number, and quantity.

5. *Packing and identification.*

5.1 Packaging shall be accomplished in such a manner as to insure that the materials being shipped will not be torn or damaged and will be protected against exposure and undue weathering and harmful materials of any kind.

5.2 Each package shall be permanently and legibly marked, and the material tagged or stamped to give the following information:

Material description ----------
AMS 3851
Meets fire resistance requirement AMS 3851
Vendor's identification----------
Purchase order number----------

6. *Approval.* A vendor shall not supply material until samples have been approved by the purchaser. After approval changes in composition, production manufacturing procedures and processes shall not be made without prior written approval by purchaser. Results of tests on incoming shipments shall be essentially equal to those obtained on approved samples.

7. *Rejections.* Material not conforming to this specification or to authorized modifications will be subject to rejection. Unless otherwise stipulated, rejected material will be returned to vendor at vendor's expense, unless purchaser receives, within three weeks of notification of rejection, other instructions for disposition.

(2) *Application.* Fire-resistant materials complying with the specifications appearing in this Technical Standard Order are hereby approved for all aircraft. Mandatory dates for the installation of such material are provided in §§ 41.20 (f) and 61.31 (b) (2) of this title.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, the material shall be permanently marked with the Technical Standard Order designation "CAA–TSO–C17" to identify the materials as meeting the requirements of this order in accordance with the manufacturer's statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for fire-resistant materials have been met.

(2) *Data requirements.* None.

(3) *Effective date.* See paragraph (b) (2) of this section.

(4) *Deviations.* Requests for deviation from or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Director, Aircraft Service, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest regional office of the Civil Aeronautics Administration, Attn: Superintendent, Aircraft Branch.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Service, A–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the fire-resistant material to be produced by him meets the minimum safety requirements established in this order. Immediately thereafter distribution of the material conforming with the terms of this order may be started and continued.

(ii) The prescribed identification on the fire-resistant material does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the fire-resistant material in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Staff, Washington 25, D. C.

§ 514.18 *Technical Standard Order C18: "Position Light Flashers"*—(a) *Introduction.* Under section 601 of the Civil Aeronautics Act of 1938, as amended, and parts 4a and 4b of this title, the Administrator of Civil Aeronautics is authorized to adopt standards for position light flashers intended for use on civil aircraft. In adopting these standards, consideration has been given to existing Government and industry standards for position light flashers.

(b) *Directive*—(1) *Provision.* (i) The performance requirements for position light flashers, as set forth in sections 3.3, 3.4 (except 3.4.2) 4 (except 4.4 and 4.5) and 5 of SAE Specification AS–211, "Flasher, Position Light" dated November 1, 1948,[1] stated below, are hereby established as minimum safety performance standards for position light flashers intended for use on civil aircraft:

1. *Purpose.* To specify minimum requirements for aircraft position light flashers, the operation of which may subject the flasher to the environmental conditions specified in section 3.3.

2. *Scope.* This specification covers two types of position light flashers:
Type I: For nominal 24 volt d. c. systems.
Type II: For nominal 12 volt d. c. systems.

3. *General requirements.*

3.1 *Materials and workmanship.*

3.1.1 *Materials.* Materials shall be of a quality which experience and/or tests have demonstrated to be suitable and dependable for the purpose intended.

3.1.2 *Choice of materials.* Choice and treatment of materials shall be such as to eliminate or minimize:
1. Corrosion.
2. Fire hazard.
3. Fungus growth.

3.1.3 *Workmanship.* Workmanship shall be consistent with high-grade aircraft electrical equipment practice.

3.2 *Identification.*

3.2.1 *Nameplate.* The following information shall be legibly and permanently marked on the unit or attached thereto:
a. Name of unit (position light flasher).
b. SAE specification AS211.
c. Voltage.
d. Normal motor current—amps.
e. Flasher contact capacity—amps.
f. Manufacturer's part number.
g. Manufacturer's serial number—(date of manufacture, optional).
h. Manufacturer's name and/or trademark.

3.2.2 *Wiring diagram.* A diagram of the internal wiring of the flasher shall be legibly marked on the unit or attached thereto.

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West Thirty-ninth Street, New York, N. Y.

3.3 *Environmental conditions.* The complete unit shall operate under the following environmental conditions and shall meet the following performance requirements:

3.3.1 *Temperature.* When mounted in accordance with the manufacturer's recommendations, the unit shall function over the range of ambient temperature from −35° C. to +55° C. It shall not be adversely affected by exposure to temperatures in the range of −65° C. to +70° C.

3.3.2 *Humidity.* The unit shall function and shall not be adversely affected by exposure to a relative humidity in the range of 5% to 90% throughout a temperature range of −35° C. to +55° C.

3.3.3 *Altitude.* The unit shall function and shall not be adversely affected when subjected to a pressure and temperature range equivalent to −1,000 feet to +25,000 feet standard altitude.

3.3.4 *Vibration.* The unit shall function and shall not be adversely affected when subjected to vibration of 0.060 inch double amplitude at from 600 to 3300 cycles per minute when tested complete with its bracket and/or shock mounts and with the direction of vibration perpendicular to its normal mounting surface.

3.3.5 *Dust.* The instrument shall function and shall not be adversely affected when subjected to severe sand and dust conditions.

3.3.6 *Salt spray.* The instrument shall function and shall not be adversely affected when subjected to a salt spray for a period of 100 hours.

3.4 *Radio interference.*

3.4.1 *Radio interference.* The flasher motor shall not be the source of objectionable interference under operating conditions, at any frequencies used on the aircraft, either by radiation or feed back, in radio sets installed in the same aircraft as the flasher. The flasher case shall be electrically continuous and shall be grounded to the aircraft structure.

3.4.2 *Interference suppression.* The motor circuit shall be provided with the necessary radio interference suppression features to suppress its radio interference to the limits set forth herein for conducted and radiated radio interference. In particular, these features shall include adequate filters and inclosing case construction which will prevent interference leakage through it or through joints, seams, and mating surfaces. The volume and weight of filtering equipment required shall be minimized by the application of proper electrical and mechanical design and construction.

3.4.3 *Conducted radio interference limits.* The conducted radio interference voltage produced by operation of the equipment on wiring connected to or associated with the equipment, when measured between each terminal and the ground plane, shall not exceed 200 microvolts over the frequency range of 0.15 to 0.2 of a megacycle and 50 microvolts over the frequency range of 0.2 to 20 megacycles.

3.4.4 *Radiated radio interference.* The radio interference field produced by operation of the equipment when measured with the rod or dipole antenna of the measuring instrument placed in various positions one foot from the equipment and interconnecting cable assemblies, shall not exceed the microvolt values shown in the following table:

Frequency band Mcs.:	*Microvolts*
0.15–65.0	2.5
65.0–100.0	5.0
100.0–150.0	10.0

4. *Detail requirements.*

4.1 *Input voltage.* The flasher shall perform under all conditions outlined herein, over these input voltages:

Type I: 22 to 28.5 volts d. c.

Type II: 11 to 14.5 volts d. c.

4.2 *Flashing cycle and accuracy.* The flashing cycle shall be repeated 40±4 times per minute. Each cycle shall be as follows:

Wing tip and white tail light "ON"	130°
Dark	50°
Top and bottom fuselage lights and red tail light "ON"	130°
Dark	50°

A maximum deviation of 5° from these periods is permissible.

4.3 *Current carrying capacity.* Flashing light circuits shall be capable of operating lamp loads having total values as follows:

Type I flasher: 3.0 amps.

Type II flasher: 6.0 amps.

They shall satisfactorily handle the inrush currents of the position lights they are to flash.

4.4 *Motor power consumption.* Normal Power Consumption of the motor circuit shall be no more than 10 watts.

4.5 *Life.* The flasher shall operate 500 hours with no adjustment or replacement of parts and shall operate 1,000 hours with no repair other than the replacement of the contacts in the light circuits.

5. *Individual performance requirements.*

5.1 *Individual performance test.* (i) Each flasher unit, before shipment shall be operated at room ambient conditions to assure that it meets the requirements of 4.2 above over the whole range of input voltages specified in 4.1. It shall also be subjected to an insulation resistance test before any internal circuits to ground are completed to assure its freedom from shorts, grounds, etc. Resistance shall not be less than 10 megohms.

(ii) For the purposes of this order, the terms "motor" and "the flasher motor" contained in sections 3.2.1 and 3.4.1 of AS–211, shall be interpreted to mean any type of actuating mechanism.

(2) *Application.* (i) Position light flashers complying with the specifications appearing in this order are hereby approved for all aircraft. Position light flashers already approved by the Administrator may continue to be installed in aircraft:

(*a*) For which an application for original type certificate is made prior to the effective date of this order,

(*b*) The prototype of which is flown within one year after the effective date of this order, and

(*c*) The prototype of which is not flown within one year after the effective date of this order if due to causes beyond the applicant's control.

(ii) If an alteration involving a change in type of model of position light flasher is made within nine months after the effective date of this order, previously approved types of position light flashers may be installed. However, in any such change made after the nine-month period, new types of position light flashers installed on aircraft used in scheduled air carrier operation shall meet the specifications contained herein.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, each position light flasher shall be permanently marked with the Technical Standard Order designation, CAA–TSO–C18 to identify the position light flasher as meeting the requirements of this order in accordance with the manufacturers' statement of conformance outlined in subparagraph (5) of this paragraph. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for position light flasher have been met.

(2) *Data requirements.* Ten copies of installation, operating, and maintenance recommendations or instructions shall be submitted by the manufacturer of the position light flasher with his statement of conformance to the Civil Aeronautics Administration, Aircraft Division, Attention: W–298, Washington 25, D. C.

(3) *Effective date.* After May 1, 1949, specifications contained in this order will constitute the basis for Civil Aeronautics Administration approval of position light flashes for use on certificated aircraft used in scheduled air carrier operation.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Chief, Aircraft Division, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest Regional Office of the Civil Aeronautics Administration, Attention: Chief, Aircraft Division.

(5) *Conformance.* (i) The manufacturer shall furnish to the CAA, Aircraft Division, W–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the position light flasher to be produced by him meets the minimum safety requirements established in this order. Immediately thereafter distribution of the position light flasher conforming with the terms of this order may be started and continued.

(ii) The prescribed identification of the position light flasher does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the position light flasher on his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Office, Washington 25, D. C.

§ 514.19 *Technical Standard Order C19a: "Portable Water-Solution Type Fire Extinguishers"*—(a) *Introduction.* Under section 601 of the Civil Aeronautics Act of 1938, as amended, and Parts 4a and 4b of this title issued pursuant thereto, the Administrator of Civil Aeronautics is authorized to adopt standards for portable fire extinguishers intended for use in civil aircraft. In adopting these standards, consideration has been given to existing Government and industry standards for portable water-solution type fire extinguishers.

(b) *Directive*—(1) *Provision.* The performance requirements for portable water-solution type fire extinguishers, as set forth in sections 5 and 6 of SAE Specification AS–245 Water-Solution Type Hand Fire Extinguishers dated No-

vember 1, 1948,[1] stated below, are hereby established as minimum safety performance standards for portable water-solution type fire extinguishers intended for use in civil aircraft:

1. *Purpose.* To specify minimum requirements for a water solution type hand fire extinguisher which shall be suitable for use on incipient fires which may occur in an airplane cabin interior. The type of fire for which these units are intended is one involving combustible materials such as paper, textiles, and similar materials.

2. *Scope.* This specification covers two basic types as follows:

Type I---------- Stored pressure type.
Type II---------- Cartridge operated type.

3. *General requirements.*

3.1 *Material and workmanship.*

3.1.1 *Materials.* Materials shall be of a quality which experience or tests have demonstrated to be suitable and dependable for use in aircraft equipment and with extinguishing medium used.

3.1.2 *Workmanship.* Workmanship shall be consistent with high-grade aircraft equipment manufacturing practice.

3.2 *Identification.* The following information shall be legibly and permanently marked on the extinguisher:

(a) Name of extinguisher.
(b) SAE Spec. No. AS-245.
(c) Capacity.
(d) Test pressure of container.
(e) Manufacturer's part or model number.
(f) Manufacturer's name and/or trade mark.
(g) Operating and maintenance instructions.

3.3 *Environmental conditions.* The following conditions have been established as design requirements only. Tests shall be conducted as specified in sections 5 and 6.

3.3.1 *Temperature.* This extinguisher shall withstand, without deterioration temperatures from −40° F., to +140° F., and shall operate satisfactorily within that temperature range.

3.3.2 *Humidity.* The extinguisher shall function and shall not be adversely affected when exposed to any relative humidity in the range of from 0 to 95% at a temperature of approximately 90° F.

3.3.3 *Altitude.* The extinguisher shall function and not be adversely affected when subjected to a pressure and temperature range equivalent to −1,000 feet to +40,000 feet standard altitude, except as limited by the application of 3.3.1.

3.3.4 *Vibration.* When mounted in accordance with the extinguisher manufacturer's instructions the unit shall not be adversely affected when subjected to a vibration of 2,400 cycles per minute with a total excursion of 3/32", and when subjected to a vibration of 3,000 cycles per minute with a total excursion of 0.015 inch.

4. *Detail requirements.*

4.1 *Design.*

4.1.1 The extinguisher shall consist of:

Type I: A container having a dischargeable capacity of at least 1⅜ quarts, a connection for pressurizing the unit and a means of controlling the discharge of the liquid content.

Type II: A container having a dischargeable capacity of at least 1⅜ quarts, a suitable holder and releasing means for the cartridge, and a means of controlling the discharge of the liquid content.

4.1.2 The container shall be designed for a minimum burst pressure of 500 p. s. i.

4.1.3 The Type I unit shall be fitted with an AN connection in accordance with AN-C-71, or equivalent, for pressurizing the unit. A pressure gage to indicate the stored pressure shall also be provided. The gage range shall be at least 100 pounds above the charged pressure of the unit at 70° F.

4.1.4 Type II units shall use as a pressurizing means a carbon dioxide filled cartridge made in accordance with Specification AN-C-105, or equivalent, but in addition suitably winterized to insure operation at −40° F. A means shall be provided to readily release the carbon dioxide from the cartridge immediately prior to the use of the units. The torque required to release the cartridge shall not exceed 25 inch-pounds. The cartridge holder shall be designed so that it cannot be assembled if the cartridge is in the wrong position. The cartridge holder shall be designed so that a simple visual inspection will indicate whether a cartridge is in the holder.

4.1.5 The extinguisher shall be provided with a valve which will control the liquid discharge. The extinguisher shall be designed so that after the unit has been placed in operation it shall be completely controllable with one hand, including starting, stopping and directing the discharge stream. The force to operate the valve shall not exceed 3 pounds if the lever type is used. If a rotary type is used the torque required shall not exceed 25 inch-pounds.

4.1.6 Type I units shall be designed so that the maximum stored pressure at 70° F. shall not exceed 175 psi. Type II units shall be designed so that the instantaneous pressure developed at 70° F. when the cartridge is released into a filled unit shall not exceed 200 psi.

4.1.7 The extinguisher shall be designed so that it cannot be overfilled with extinguishing medium.

4.1.8 The extinguisher shall be provided with a satisfactory seal to indicate tampering and/or operation.

4.2 *Liquid charge:*

4.2.1 The liquid used as the extinguishing medium shall be as free from corrosive effects as practicable.

4.2.2 The fire extinguishing liquid shall be non-toxic and non-injurious to personnel and shall not form injurious toxic fumes when discharged on a fire.

4.2.3 The fire extinguishing liquid shall not deteriorate or lose its efficiency over a one-year period.

4.2.4 The fire extinguishing liquid shall have extinguishing qualities equal to or better than an equal quantity of water when used at 70° F.

4.2.5 A wetting agent may be used provided the resulting solution complies with all requirements of the specification.

4.3 *Discharge characteristics:*

4.3.1 At 70° F. the time of effective discharge for a full extinguisher shall be not less than 30 nor more than 45 seconds.

4.3.2 At 70° F., with the extinguisher nozzle approximately 4 feet above the floor, it shall throw a stream a horizontal distance of not less than 20 feet and maintain this range for at least three-quarters of the contents.

4.3.3 The extinguisher at 70° F. shall be capable of discharging three-quarters of its contents by directing the stream in any desired direction.

4.4 *Bracket.*

4.4.1 A bracket shall be furnished from which the extinguisher can be quickly and easily removed. The bracket shall be designed to hold the charged extinguisher against an acceleration force of 10 g. applied in any direction.

5. *Individual performance requirements.* All extinguishers, or components of same, shall be subjected to whatever tests the manufacturer deems necessary to demonstrate specific compliance with this specification, including the following requirements:

5.1 *Hydrostatic tests.* Each container shall be hydrostatically tested to 250 psi for a one minute period and shall show no leakage or detriment effects.

6. *Qualification tests.* As many extinguishers as deemed necessary by the manufacturer to demonstrate that all extinguishers will comply with the requirements of this section shall be tested. The tests of each extinguisher shall be conducted consecutively and after the tests have been initiated, no servicing (except recharging and repressurizing) or adjustments shall be permitted. For both types of extinguishers, these tests shall be conducted with a fully charged unit. The Type I units shall be pressurized to the recommended pressure at 70° F. The Type II units shall have the cartridge inserted in the holders.

6.1 *High temperatures.* The extinguisher shall be subjected to a temperature of 140° F. for a period of 6 hours and then discharged. The discharge characteristics shall not vary more than 25 percent from the figures in section 4.3.

6.2 *Low temperature.* The extinguisher shall be subjected to a temperature of −40° F. for a period of 6 hours and then discharged. The discharge characteristics shall not vary more than 40 percent from the figures in section 4.3.

6.3 *Vibration.* The extinguisher shall be placed in its bracket which shall be attached to a vibration stand. The vibration tests shall be conducted at 2,400 cycles per minute with a total excursion of 3/32 inch and at 3,000 cycles per minute with a total excursion of 0.015 inch. The assembly shall be vibrated for a three hour period with its major axis vertical and for a similar period with its major axis horizontal. At the completion of the vibration tests, the extinguisher and bracket shall be examined to determine that no looseness in the units nor damage to a part has resulted. The extinguisher shall be discharged to determine compliance with the discharge characteristics of section 4.3.

6.4 *Fire tests.* The extinguishing medium shall be tested to determine compliance with the requirements of section 4.2.4.

(2) *Application.* (i) Portable water-solution type fire extinguishers already approved by the Administrator may continue to be installed in aircraft:

(*a*) For which an application for original type certificate is made prior to the effective date of this order,

(*b*) The prototype of which is flown within one year after the effective date of this order, and

(*c*) The prototype of which is not flown within one year after the effective date of this order if due to causes beyond the applicant's control.

(ii) If an alteration involving a change in type or model of portable water-solution fire extinguisher is made within nine months after the effective date of this order, previously approved types of portable water-solution type fire extinguishers may be installed. However, in any such change made after the nine month period, new types of portable water-solution type fire extinguishers installed shall meet the specifications contained in this section.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, each portable water-solution type fire extinguisher shall be permanently marked with the Technical Standard Order designation, CAA-TSO-C19, to identify the extinguisher as meeting the requirements of this order in

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West 39th St., New York, N. Y.

accordance with the manufacturers' statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for portable water-solution type fire extinguishers have been met.

(2) *Data requirements.* None.

(3) *Effective date.* After June 1, 1949, specifications contained in this order will constitute the basis for Civil Aeronautics Administration approval of portable water-solution type fire extinguishers for use in certificated aircraft.

(4) *Deviations.* Requests for deviation from, or waiver of the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Chief, Aircraft Division, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest Regional Office of the Civil Aeronautics Administration, Attn: Chief, Aircraft Division.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Division, Attn: W–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the portable water-solution type fire extinguisher to be produced by him meets the minimum safety requirements established in this order. Immediately thereafter distribution of the extinguisher conforming with the terms of this order may be started and continued.

(ii) The prescribed identification on the portable water-solution type fire extinguisher does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the extinguisher in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Office, Washington 25, D. C.

§ 514.20 *Technical Standard Order C20: "Combustion Heaters"*—(a) *Introduction.* Under section 601 of the Civil Aeronautics Act of 1938, as amended, and Parts 3, 4a and 4b of this title, the Administrator of Civil Aeronautics is authorized to adopt standards for combustion heaters intended for use in civil aircraft. In adopting these standards, consideration has been given to existing Government and industry standards for combustion heaters.

(b) *Directive*—(1) *Provision.* The requirements for combustion heaters, as set forth in SAE Aeronautical Standard AS143B; Heaters, Airplane, Internal Combustion Heat Exchanger Type, dated February 1, 1949,[1] stated below, are hereby established as minimum safety standards for combustion heaters intended for use in civil aircraft:

1. *Purpose.* To specify standards covering minimum safety and performance requirements for internal combustion heaters and certain auxiliary devices which are considered necessary to the safety and performance of the heaters as used in aircraft. These standards are to be considered currently applicable and necessarily subject to revision from time to time due to rapid development of the aeronautical industry. The following standards are based on practical engineering requirements for such internal combustion heat exchanger type heaters as are now used on airplanes and for such as may be developed to meet later requirements.

2. *Scope.* These standards are written to cover internal combustion heat exchanger type heaters used in the following applications:

2.1 Cabin heating. (All occupied regions and windshield heating.)

2.2 Wing and empennage heating.

2.3 Engine and accessory heating. (When heater is installed as part of the aircraft.)

3. *Definition.* An internal combustion heat exchanger type heater as used for airplane heating is one that utilizes through a heat exchanger the heat produced by combustion of a fuel within the heater for the purpose of heating the air being supplied to the airplane.

4. *General requirements.*

4.1 *Heater components.* An internal combustion type heater shall include all of the following:

4.1.1 Combustion chamber and heat exchanger assembly.

4.1.2 Casing or shroud for combustion chamber and heat exchanger assembly.

4.1.3 Igniter.

4.1.4 Burner.

4.1.5 Ventilating air inlet.

4.1.6 Ventilating air outlet.

4.1.7 Combustion air inlet.

4.1.8 Exhaust outlet.

4.1.9 Fuel inlet.

4.2 *Additional devices.* In addition to the heater, the following additional devices are considered necessary to the safety and performance of the heater and will be covered in that respect by these standards. These devices may be furnished separately or as part of the heater. These standards do not cover all tests necessary on these devices, but only those required in their relationship to the heater.

4.2.1 Fuel system.

4.2.1.1 Fuel nozzle, restrictor, orifice, or equivalent.

4.2.1.2 Fuel shutoff valve.

4.2.1.3 Fuel filter.

4.2.2 Safety controls.

4.2.2.1 A device to prevent the heater from becoming overheated.

4.2.2.2 A device to prevent fuel flow to the heater when combustion air is insufficient for safe operation.

4.2.3 Ignition system. (Required for spark ignition only.)

4.2.3.1 Device to provide high voltage power.

4.2.3.2 High voltage ignition lead assembly or equivalent electrical linkage between high voltage device and spark plug.

4.3 *Materials and workmanship.*

4.3.1 The heater and auxiliary equipment shall be constructed throughout of materials which are considered acceptable for the particular use intended and shall be made and furnished with a degree, uniformity, and grade of workmanship generally accepted in the aircraft industry.

4.3.2 The heater casing or shroud shall be constructed of fireproof material.

4.4 *Design features.*

4.4.1 The design shall be such as to preclude the possibility of discharging harmful concentrations of carbon monoxide into the ventilating air stream. See test, paragraph 6.5.4.1.

4.4.2 Where specified, the design shall be such as to preclude excessive loss of pressurized fuselage air. See test, paragraphs 6.5.4.2 and 6.5.4.3.

4.4.3 The design shall include protection against excessive radio interference. See test, section 6.4.

4.4.4 The design shall be such as to preclude harmful effects on construction or performance due to vibration. See test, section 6.3.

4.4.5 The design shall be such that the life of the heater and accompanying devices shall be comparable to other similar airframe components and accessories. See test, section 6.5.

4.4.6 Unless otherwise specified, the design shall be such that the heater and accompanying devices shall operate satisfactorily within normal ranges of power, fuel, and air supplies available in aircraft.

4.5 *Heater identification.* The following minimum information shall be legibly and permanently marked on the heater or on a nameplate attached thereto:

(a) Manufacturer's name and/or trademark.

(b) Manufacturer's part number.

(c) Manufacturer's serial number.

(d) SAE rated output, ------ B. t. u. hr. (See section 5.1.)

(e) Rated fuel pressure, --------- psig.

(f) Electrical characteristics.

(g) SAE Spec. AS–143B. For Use: Unpr. cabin ---------, Press. cabin ---------, Wing -------. (Stamp "X" in one or more blanks as applicable.)

5. *Detail requirements.*

5.1 *SAE rating conditions.* Heater shall deliver at least SAE rated output at following conditions:

5.1.1 Sea level ambient pressure.

5.1.2 Rated fuel pressure, as specified by manufacturer.

5.1.3 Rated sea level combustion air rate, as specified by manufacturer.

5.1.4 Ventilating air temperature rise of 250° F.

5.1.5 Inlet temperature of fuel and air between 50° F. and 125° F.

5.2 *Air supply.*

5.2.1 When sufficient combustion or ventilating air for safe operation is not available the heater shall be made automatically inoperative. See tests, paragraphs 6.5.7.1 and 6.5.7.2.

5.2.2 The combustion air and ventilating air inlets on the heater shall be separated from each other.

5.3 *Fuel supply.*

5.3.1 The fuel lines and fittings under pressure in the heater shall be enclosed in such manner as to prevent any fuel leakage from entering the ventilating air stream, and the enclosure shall have adequate provision for draining to the combustion chamber or to a fuel drain fitting.

5.3.2 A fuel drain outlet or equivalent safety device shall be provided to prevent accumulation of fuel in the combustion chamber and heat exchanger assembly in case the fuel flows without igniting.

5.3.3 All fuel lines in the heater shall be constructed of steel or other fire resistant material. Where flexibility is required in these lines, flexible fire resistant coupled hose assemblies shall be used to eliminate the possibility of using hose clamp connections. Connections in metal fuel lines shall not employ solder nor other relatively low melt-

[1] Copies may be obtained from the Society of Automotive Engineers, 29 West 39th St., New York, N. Y.

ing point materials which cannot withstand a 2000° F. flame for five minutes.

5.3.4 All gaskets, synthetic rubber seals, etc. shall be suitable for use with aromatic fuels and shall be satisfactory for use at the temperatures encountered within the overheating limits of the heater.

5.3.5 The fuel system lines, fittings and controls shall be sufficiently isolated from the combustion side of the heater to prevent their being damaged by flame, radiant heat or backfire.

5.4 *Combustion chamber and heat exchanger assembly.*

5.4.1 The combustion chamber and heat exchanger assembly shall be constructed from a corrosion and heat resistant material in accordance with SAE Aeronautical Material Specification AMS 5540, or equivalent.

5.4.2 Means shall be provided to minimize malfunctioning due to lead deposits and to permit disassembly and cleaning of all parts affected by products of combustion.

5.4.3 The accumulation of lead scale or products of combustion deposits shall not cause functional failure before 500 hours of heater operation.

5.4.4 The heater combustion chamber and heat exchanger assembly shall be so designed that it will not rupture under the most severe explosion conditions that can occur with any possible fuel air mixture as demonstrated by test procedure outlined in section 6.1.6.

5.5 *Exhaust.*

5.5.1 The temperature of the exhaust gases at the point of discharge from the heater shall not exceed 1200° F. at rating. (See section 5.1.)

5.6 *Ignition.*

5.6.1 Ignition may be accomplished by:

5.6.1.1 Electrically heated resistance hot wire.

5.6.1.2 Electric high-voltage spark plug.

5.6.2 Ignition may be sustained during operation of the heater or discontinued if satisfactory combustion is assured.

5.6.3 The igniter shall be capable of functioning over a period of 200 hours without service. See test, section 6.5.5.

5.6.4 In event of ignition delay for an indefinite period, either with or without fuel supply, no hazardous condition shall result.

5.6.5 Heaters which are intended for wing-empennage heating shall ignite within 15 seconds under conditions of paragraph 6.1.2.3 except that the temperature shall not be higher than −20° F.

5.7 *Safety controls.* The following automatic safety controls shall be furnished separately or as part of the heater. These controls shall be independent of and in addition to the normal operating controls.

5.7.1 A control to shut off the heater fuel flow in case combustion air supply is insufficient for safe operation.

5.7.2 A control to prevent the heater from becoming overheated under any condition of ventilating air flow.

5.8 *Lines and fittings.*

5.8.1 All pipe and tubing fittings used shall comply with applicable AN standards.

5.8.2 Other fittings not covered above shall conform to accepted aircraft practice.

5.9 *Electrical equipment.*

5.9.1 All electrical equipment, including wiring, instruments, motors, insulation, shielding, relays, etc., shall conform to acceptable aircraft practice.

6. *Test requirements and methods.*

6.1 *Performance tests.* Tests shall be conducted to establish the following:

6.1.1 Ignition characteristic curve, plotting altitude as the ordinate and combustion air pressure differential as the abscissa such that the area under the curve represents the region of reliable starting and burning at −65° F. Include information on temperature of fuel and combustion air supplied to heater. The service ceiling of the heater and its accompanying ignition devices shall be defined as the peak of the ignition characteristic curve. A time record shall be kept on each test start.

6.1.2 Heat output, ventilating air pressure drop, combustion air pressure drop, exhaust temperature, ventilating air temperature rise, fuel rate at—

6.1.2.1 Sea level rating. (See section 5.1.)

6.1.2.2 Sea level rating, except with −65° F. inlet ventilating air, combustion air, and fuel temperatures.

6.1.2.3 20,000 feet pressure altitude with:

(a) Sea level rated weight of ventilating air at −65° F., inlet temperature.

(b) Combustion air at −65° F., inlet temperature, and combustion air pressure differential midway between 20,000 feet altitude ignition limits determined in 6.1.1.

(c) Sea level rated values of voltage and fuel pressure.

(d) Fuel at −65° F., inlet temperature.

NOTE: Temperature measurements for output shall be made in a manner which will provide a representative average temperature of the discharge air. Temperature sensing elements used in test shall be protected against effects of radiation from the heater.

6.1.3 Maximum starting and maximum running amperages required with normal voltage for operation of the heater and accompanying devices at sea level.

6.1.4 Voltage range within which the heater and accompanying devices will operate at sea level and service ceiling.

6.1.5 Collapsing pressure of the combustion chamber and heat exchanger assembly.

6.1.5.1 The heater shall be set up with an adjustable restriction on the combustion air inlet, and a source of vacuum connected to the exhaust outlet. The ventilating air shall discharge freely to atmosphere (sea level). A static pressure tap shall be provided in the exhaust pipe within 12" of the connection to the heater.

6.1.5.2 For a non-pressurized cabin heater or a wing-empennage heater, the heater shall be operated at sea level rating, except that the exhaust outlet pressure is to be maintained at a value which is at least 4 psi below the ventilating air outlet pressure. After operating the heater for at least one hour at these conditions, there must be no permanent distortion of any part of the heater, unless it can be demonstrated that such distortion does not affect the performance or life of the heater.

6.1.5.3 For pressurized cabin heaters, the test shall be the same as 6.1.5.2 except that the exhaust outlet pressure shall be maintained at a value which is at least 10 psi below the ventilating air outlet pressure.

6.1.6 *Combustion chamber burst pressure.* The following design test shall demonstrate compliance with section 5.4.4.

6.1.6.1 With the combustion chamber and heat exchanger assembly at room temperature, introduce a gaseous fuel air mixture in a ratio of from .085 to .095. Purge the combustion chamber and heat exchanger assembly with this mixture to the extent of at least ten times the volume of the combustion chamber and heat exchanger assembly. Ignite the mixture with the heater igniter. Repeat procedure to complete 50 explosions. The heater shall then meet the leakage requirements of section 6.5.4.2.

6.1.7 Radio interference noise levels. See test, section 6.4.

6.1.8 Effect of vibration of heater and accompanying devices. See test, section 6.3.

6.1.9 Minimum life and service requirements of heater and accompanying devices. See test, section 6.5.

6.2 *Test report.* The manufacturer shall furnish a report, on request, covering tests. This report shall include an introduction, a summary, a description of apparatus, instrumentation, and tests, the results, a discussion, and conclusions.

6.3 *Vibration test.* The heater and auxiliary equipment shall be capable of withstanding and satisfactorily operating when subjected to a steady vibration over a range of frequencies from 600 to 2,700 cycles per minute with a total excursion of 1/16", and from 2,700 to 3,200 cycles per minute with an acceleration not exceeding 6 G's. Unless otherwise specified in detail specifications, the equipment shall be mounted on the vibrating apparatus with the longitudinal axis of the heater in a plane parallel to the vibrating surface of the apparatus and normal to the direction of vibration.

6.3.1 The heater shall be vibrated over a range of from 600 to 2,700 cycles per minute with a total excursion of $\frac{1}{16}$". The frequencies at which resonance occurs, if any, shall be observed and noted.

6.3.2 The heater will be vibrated over a range of from 2,700 to 3,200 cycles per minute with an acceleration of not less than 5 G's and not more than 6 G's. The frequencies at which resonance occurs, if any, shall be observed and noted.

6.3.3 If resonance is observed under the test of either 6.3.1 or 6.3.2, a vibration test shall be conducted for fifteen hours at the frequency showing the maximum resonance.

6.3.4 If no resonance is observed under the tests of 6.3.1 or 6.3.2, a vibration test shall be conducted for 15 hours at 2,700 cycles per minute with $\frac{1}{16}$" total excursion.

6.3.5 At the conclusion of the vibration test there shall be no evidence of structural failure and the heater and accompanying devices shall operate satisfactorily.

6.4 *Radio interference test.*

6.4.1 The heater shall be set up with a sleeve of bare metal ductwork having the same diameter as the heater casing connected at each end of the casing. The length of each piece of ductwork shall be not less than five diameters and shall be connected to the heater with a clamp of the type normally used in an installation.

6.4.2 In the same manner as 6.4.1, connect ductwork or tubing to the combustion air inlet and to the exhaust outlet with respective dimensions determined by diameters of the combustion air inlet and exhaust outlet fittings.

6.4.3 If the ignition voltage transformer is not part of the heater, mount in external to the heater and connect the high voltage terminal to the spark plug by means of the high voltage ignition lead assembly.

6.4.4 With the ignition system operating, check the complete assembly including heater, high voltage device, and high voltage ignition lead assembly using the recommended procedure of specification JAN–I–225 dated June 14, 1945, and Radio Interference Noise Limit Specification AAF–32466–A dated October 17, 1945.

6.5 *Life tests.* Life tests may be conducted in such manner as to qualify the heater and accompanying devices for cabin heating, wing-empennage anti-icing, or both. For cabin heating only, the duration of the test shall be at least 850 hours "on" time. For wing-empennage anti-icing only, the duration of the test shall be at least 500 hours "on" time. For qualification of the heater and accompanying devices under both cabin heating and wing-empennage classifications, the duration of the test may be 850 hours heater "on" time providing at least 500 hours "on" time is performed at wing-empennage conditions.

6.5.1 *General conditions.* The general conditions applying to both cabin and wing-empennage heater life tests shall be as follows:

6.5.1.1 Tests shall be performed at sea level rated fuel pressure and sea level rated combustion air rate.

6.5.1.2 Inlet air temperature shall not exceed 125° F.

6.5.1.3 Approximately 50% of the life test shall be with "continuous" operation, and the remainder of the test with "rapid cycling" operation.

6.5.1.3.1 During "continuous" operation, the ventilating air rate shall be adjusted as required to give the specified temperature rise under steady conditions. At least once, and not more than twice, during each two hours of operating time, the fuel and ignition system shall be shut off and the heater permitted to cool for at least 10 minutes with continuous ventilating air and combustion air flow. In calculating total "on" time for the heater, the 10-minute cooling periods shall not be included.

6.5.1.3.2 During "rapid cycling" operation, a thermostatic switch in the ventilating air outlet stream shall cycle the fuel on and off and maintain a specified outlet air temperature. The ventilating air rate shall be adjusted so that the average heat output (assuming that the setting of the cycling switch represents the average outlet air temperature) is between 60 and 75% of the rated output. At least once, and not more than twice during each 2 hours of operating time, the fuel and ignition system shall be shut off and the heater permitted to cool for at least 10 minutes with continuous ventilating air and combustion air flow. For cycling operation "on" time is defined as the total elapsed time during which the rapid cycling switch controls the heater operation; it does not include the 10-minute cooling periods.

6.5.2 *Cabin heater life tests.* The cabin heater life tests shall be divided into four periods, as follows:

6.5.2.1 *First period—250 hours.* Continuous operation, with the ventilating air rate adjusted to maintain a temperature rise of at least 200° F. and an outlet air temperature of at least 250° F.

6.5.2.2 *Second period—250 hours.* Rapid cycling operation, with the cycling switch set to control at 250±10° F. outlet air temperature.

6.5.2.3 *Third period—175 hours.* Same conditions as first period.

6.5.2.4 *Fourth period—175 hours.* Same conditions as second period.

6.5.3 *Wing-empennage anti-icing heater life tests.* Wing-empennage anti-icing heater life tests shall be divided into two periods, as follows:

6.5.3.1 *First period—250 hours.* Continuous operation, with the ventilating air rate adjusted to maintain a temperature rise of at least 300° F. and an outlet air temperature of at least 350° F.

6.5.3.2 *Second period—250 hours.* Rapid cycling operation, with the cycling switch set to control at 350±10° F. outlet air temperature.

6.5.4 *Performance after tests.* At the end of the life and vibration tests the heater shall meet the following requirements:

6.5.4.1 *Carbon monoxide contamination.* At rating conditions, and with the burner operating, carbon monoxide concentration in the heated ventilating air stream shall not exceed one part in 20,000 or 0.005 of 1%. This test shall be run with the heater exhaust discharging to atmosphere. The ventilating air samples shall be taken from an unrestricted duct fastened to the heater ventilating air outlet. The duct shall be the same diameter as the heater casing and at least 5 diameters in length. Use carbon monoxide detector assembly AAF No. 46B1790 or Navy Stock No. R–83–BUA–9258, or equivalent.

6.5.4.2 *Leakage.* With an air pressure of 8 psig inside the combustion chamber and heat exchanger assembly, leakage shall not exceed 9 lbs/hr. (sea level and 59° F.). There shall be no leaks which could allow liquid fuel to enter the ventilating air stream in event of ignition failure, when the heater is mounted in any normal position, with drains open.

6.5.4.3 For pressurized cabin heaters, with pressurized jacket, air leakage through the ventilating air shroud or casing shall not exceed 10 lbs/hr. at sea level and room temperature when air pressure of 16 psig is applied to the ventilating air passages.

6.5.4.4 When heater is to be used for wing-empennage anti-icing, the output shall be not less than 90% of the original rating after the life test. If the heater is to be used for cabin heating, the manufacturer shall record in the test report the heater output at the end of the life test.

6.5.5 *Igniter.* Whenever it becomes necessary due to ignition failure during the life test, the igniter may be cleaned, adjusted, or replaced. However, the igniter shall not require servicing or replacement more than twice during the life test of a wing-empennage heater or more than four times during the life test of a cabin heater.

6.5.6 *Fuel system.*

6.5.6.1 Whenever necessary due to stoppage or failure, the fuel orifice or nozzle may be cleaned or replaced. Such servicing shall not be required more than once during a wing-empennage heater life test or twice during a cabin heater life test.

6.5.6.2 The fuel shut off valve may be cleaned once during a wing-empennage heater life test and twice during a cabin heater life test. It shall not be cleaned, serviced, or replaced due to failure to close during the life test. At the end of the life test the valve leakage in the closed position with rated fuel pressure shall not exceed two cubic centimeters of fuel in ten minutes.

6.5.6.3 The fuel filter may be cleaned or the filter element replaced but the filter body shall not be replaced during the life test. At the end of the life test there shall be no leakage through the case or body.

6.5.7 *Safety controls.*

6.5.7.1 The device used to prevent the heater from becoming overheated shall not be serviced or replaced during the life test due to failure to shut off the heater. At the beginning of the life test and at the end of each test period (section 6.5.2 or 6.5.3), any cycling or intermediate controls shall be bypassed and the ventilating air rate gradually reduced over a period of 15 minutes to permit operation of this device. Operation shall be within ±25° F. of the value obtained at the beginning of the life test.

6.5.7.2 The device to prevent fuel flow when combustion air is insufficient for safe operation shall be sensitive to heater combustion air pressure differential or to combustion air pressure. The device may be an air actuated electrical switch designed for use with an electrical fuel shut off valve, or an air actuated mechanical valve designed to control the flow of fuel.

6.5.7.2.1 If an air actuated electrical switch is used, it shall be checked as follows at the end of each test period (section 6.5.2 or 6.5.3) with the heater in operation:

6.5.7.2.1.1 Reduce the combustion air differential pressure or combustion air pressure gradually (approximately 30 seconds) from normal rating to a point where the switch closes the electrical fuel shut off valve. The combustion air differential pressure or combustion air pressure at which the fuel shut off valve closes shall not be less than the minimum value required for safe heater operation. At the end of 15 minutes "fuel off" time, the combustion air differential pressure or combustion air pressure, as applicable, shall be gradually increased at the same rate and the switch shall open the electrical fuel shut off valve at or above the rated combustion air pressure differential.

6.5.7.2.2 If an air actuated mechanical fuel valve is used it shall be checked as follows at the end of each test period (sections 6.5.2 or 6.5.3):

6.5.7.2.2.1 With the heater operating and with the fuel shut off valve "open", the combustion air differential pressure shall be reduced gradually (approximately 30 seconds) from normal rating to value required for safe heater operation. Leakage through the air actuated mechanical fuel valve shall then be measured and shall not exceed two cubic centimeters in ten minutes. At the end of 15 minutes "fuel off" time, the combustion air differential pressure shall be gradually increased at the same rate and the valve shall permit rated fuel flow when the rated combustion air pressure differential is reached.

6.5.7.3 *Ignition system.*

6.5.7.3.1 If necessary, the high voltage device may be serviced or parts replaced once during the life test.

6.5.7.3.2 If necessary, the high voltage ignition lead assembly or equivalent may be serviced or replaced once during the life test.

6.5.7.4 Unless otherwise specified, items 6.5.7.1, 6.5.7.2, 6.5.7.2.1, 6.5.7.2.2, 6.5.7.3, and 6.5.7.3.2, if furnished separately, not as part of the heater, need not be tested more than once providing no changes are made in their design, construction, or adjustment.

6.5.7.5 In case of life test failure of one or more of the devices in items 6.5.7.1, 6.5.7.2, 6.5.7.2.1, 6.5.7.2.2, 6.5.7.3, and 6.5.7.3.2, the test may be continued to qualify the heater or devices that have not failed. A separate life test shall apply only to the failed device if necessary to establish reliability.

7. *Desirable features* (Not Mandatory).

7.1 *Operation.*

7.1.1 The operation of the heater and accompanying devices should require a minimum of moving parts.

7.1.2 The heater should start operation within five seconds at −65° F. at sea level and at its service ceiling, and should reach its maximum output within three minutes after being started.

7.1.3 The heater should be designed in such a manner as to preclude violent explosions on being started.

7.1.4 The heater should be designed in such a manner and made from such materials as to withstand deteriorating effects of high humidity, condensation, fungus, and abrasive particles in the air.

7.1.5 The heater and its accompanying devices should not be adversely affected if subjected to ambient temperatures up to 160° F. for indefinite periods.

7.1.6 The heater should be designed to give low air pressure drop at high altitudes.

7.1.7 Where necessary, additional devices such as the following, may be provided to improve heater operation.

7.1.7.1 Air pressure regulator.
7.1.7.2 Fuel pressure regulator.
7.1.7.3 Combustion air blower.
7.1.7.4 Ventilating air blower.
7.1.7.5 Fuel air ratio control.
7.1.7.6 Thermal cycling switch.
7.1.7.7 Cabin heat controls.

7.2 *Igniter.* The igniter should be accessible for quick replacement or servicing.

7.3 *Fuel nozzle.* The fuel nozzle should be accessible for quick replacement or servicing.

(2) *Application.* (i) Combustion heaters complying with the specifications appearing in this order are hereby approved for all aircraft. Heaters already approved by the Administrator may continue to be installed in aircraft:

(*a*) For which an application for original type certificate is made prior to the effective date of this order.

(*b*) The prototype of which is flown within one year after the effective date of this order, and

(*c*) The prototype of which is not flown within one year after the effective date of this order if due to causes beyond the applicant's control.

(ii) If an alteration involving a change in type or model of heater is made within nine months after the effective date of this order, previously approved types of heaters may be installed. However, in any such change made after the nine-month period, new types of heaters in-

stalled shall meet the specifications contained in this section.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, each heater shall be permanently marked with the Technical Standard Order designation, CAA–TSO–C20, to identify the heater as meeting the requirements of this order in accordance with the manufacturers' statement of conformance outlined in subparagraph (5) of this paragraph. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for combustion heaters have been met.

(2) *Data requirements.* Ten copies of the following technical information shall be submitted by the manufacturer of the heater with his Statement of Conformance to the Civil Aeronautics Administration, Aircraft Division, Attn: W–298, Washington 25, D. C.:

(i) Rated combustion air flow rates (or pressure drop) including minimum safe rate and variation with altitude.

(ii) Rated ventilating air flow rates (or pressure drop) including minimum safe rate and variation with altitude.

(iii) Ignition characteristics curve established in accordance with section 6.1.1 of Specification AS143B.

(iv) Minimum operating voltage used for subdivision (iii) of this subparagraph.

(v) Maximum operating altitude.

(vi) Operating fuel pressure.

(vii) Installation diagram showing installation of safety devices necessary to achieve compliance with sections 4.2, 5.7 and 6.5.7 through 6.5.7.2.2.1 of Specification AS143B.

(viii) Recommended electrical arrangement and any necessary limitations and pressure or temperature settings which are considered essential to proper and safe installation and operation.

(3) *Effective date.* After June 15, 1949, specifications contained in this order will constitute the basis for Civil Aeronautics Administration approval of combustion heaters for use in certificated aircraft.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Chief, Aircraft Division, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest Regional Office of the Civil Aeronautics Administration, Attn: Chief Aircraft Division.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Division, Attn: W–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the heater to be produced by him meets the minimum safety requirements established in this order. This statement shall indicate whether the heater meets the standards for cabin or wing-empennage heaters as prescribed in SAE Aeronautical Standard AS–143B and whether it has met the standards of this specification pertinent to pressurized systems. Immediately thereafter distribution of the heaters conforming with the terms of this order may be started and continued.

(ii) The prescribed identification on the heater does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the heater in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Office, Washington 25, D. C.

§ 514.21 *Technical Standard Order C21: "Special Aircraft Turnbuckle Assemblies and/or Turnbuckle Safetying Devices"*—(a) *Introduction.* (1) Under section 601 of the Civil Aeronautics Act of 1938, as amended, and Parts 3, 4a, 4b, and 6 of this title issued pursuant thereto, the Administrator of Civil Aeronautics is authorized to adopt standards for special turnbuckle assemblies and/or safetying devices intended for use in civil aircraft. In adopting these standards, consideration has been given to existing Government and industry specifications for special turnbuckle assemblies and/or safetying devices.

(2) This Technical Standard Order is intended to serve as a criterion by which the product manufacturer may obtain Civil Aeronautics Administration approval of his special aircraft turnbuckle assemblies and/or turnbuckle safetying devices. These requirements for special turnbuckle assemblies do not affect the present policy under which turnbuckle assemblies conforming with existing standards (such as Army, Navy, NAS specifications) are acceptable for use in civil aircraft when appropriate for the purpose intended. Aircraft manufacturers may also obtain approval of special turnbuckles as part of their aircraft design and should include the special turnbuckle on the Aircraft drawings. Such approval will be recognized by all Civil Aeronautics Administration representatives.

(b) *Directive*— (1) *Provision.* (i) The performance requirements for special turnbuckle assemblies and/or safetying devices, as set forth in Sections C, D, E, and F of Army-Navy Aeronautical Specifications AN–T–19,[1] together with the additional tests set forth below when applicable, are hereby established as minimum safety performance standards for special turnbuckle assemblies and/or safetying devices intended for use in civil aircraft.

A. *Applicable specifications.* A–1. The following specifications of the issue in effect on date of invitation for bids shall form a part of this specification:

A–1a. Army-Navy Aeronautical Specifications:
- AN–QQ–B–646—Brass, Rolled; Bar-and-Rod (for Turnbuckle Barrels)
- AN–C–52—Compound; Exterior-Surface Corrosion Preventive
- AN–P–13—Preservation and Packaging; Parts and Equipment (General Specification For)
- AN–P–32—Plating; Zinc
- AN–P–61—Plating; Cadmium
- AN–P–72—Plywood; Container
- AN–S–14—Steel; Chrome-Nickel-Molybdenum (8630) Bar and Rod
- AN–QQ–S–684—Steel; Chrome-Molybdenum (X4130) Bar-and-Rod
- AN–QQ–S–771—Steel; Corrosion-Resisting (18 Cr–8 Ni), Bars and Rods
- AN–T–15—Tubing; (.27 to .33 Carbon) Chrome-Nickel-Molybdenum Steel seamless
- AN–WW–T–850—Tubing; Steel Chrome-Molybdenum (X4130) Seamless
- AN–T–70—Tubing; Brass Seamless

A–1b. Joint Army-Navy Specifications:
- JAN–P–105—Packaging and Packing for Overseas Shipment; Boxes, Wood, Cleated, Plywood
- JAN–P–106—Packaging and Packing for Overseas Shipment, Boxes; Wood, Nailed
- JAN–P–120—Packaging and Packing for Overseas Shipment, Cartons, Folding, Paperboard
- JAN–P–125—Packaging and Packing for Overseas Shipment, Barrier Materials, Waterproof; Flexible
- JAN–P–133—Packaging and Packing for Overseas Shipment, Boxes, Set-Up, Paperboard

A–1c. Federal Specifications:
- QQ–M–151—Metals; General Specification for Inspection of

A–1d. Other Government Specification:
- 100–14:39P16—Packaging and Packing for Overseas Shipment, Army-Navy General Specification For

A–1e. Army-Navy Aeronautical Standard Drawings:
- AN155—Barrel, Turnbuckle
- AN161—Fork, Turnbuckle
- AN165—Eye, Turnbuckle (For Pin)
- AN170—Eye, Turnbuckle (For Cable)

A–2. Special requirements of the individual Departments of the Government are noted under section H.

B. *Types.* B–1. This specification covers turnbuckle assemblies and component parts identified by the type designations and part numbers shown on the applicable AN Standard Drawings.

C. *Material and workmanship.* C–1. *Materials.* Materials not specifically designated herein shall be of the best quality, of the lightest practicable weight, and entirely suitable for the purpose intended. Materials used shall be of aircraft quality, free from flaws and other injurious defects.

C–2. *Workmanship.* Shall conform to high grade aircraft practice. The finished surfaces shall be smooth and free from pronounced tool marks.

D. *General requirements.* D–1. *Finishes and Coatings:*

D–1a. *Finish; corrosion-resisting steel turnbuckle ends.* Fork and eye turnbuckle ends made of corrosion-resisting steel, shall be ground or polished to a bright finish on all external surfaces, except threaded ones. These parts shall be passivated by either of the following processes (preferably of Hot process) after the removal of all oil or grease.

D–1a (1). *Hot process.* Submerge the parts in a solution containing four parts water to

[1] Copies may be obtained from the Air Matériel Command, Wright-Patterson Air Force Base, Dayton, Ohio, or from the Naval Aircraft Modification Unit, Johnsville, Pa.

one part commercial nitric acid, specific gravity 1.380 to 1.408 at 52 to 57° C. (125 to 135° F.), for 20 to 40 minutes.

D–1a (2). *Cold process.* Submerge the parts in a solution containing one part water to one part commercial nitric acid, specific gravity 1.389 to 1.408 at approximately 21° C. (70° F.), for one to two hours.

D–1a (3). *Washing.* All parts shall be thoroughly washed in water and dried after passivation.

D–2. *Plating.* Carbon and low alloy steel turnbuckle ends and barrels, including the external threaded portion, shall be cadmium plated in accordance with Specification AN–P–61, or zinc plated in accordance with Specification AN–P–32. The bore of the steel turnbuckle barrels shall be coated with corrosion-preventive compound, Type I, Specification AN–C–52. Corrosion-resisting steel parts shall not be plated.

E. *Detail requirements.* E–1. *Construction.* The construction of turnbuckles and component parts shall be as specified on the applicable drawings.

E–a. *Fork and eye turnbuckle ends.* Any carbon or low alloy steel in which the sulphur content does not exceed 0.050 percent and the phosphorus content does not exceed 0.040 percent may be used for fork and eye turnbuckle ends provided the finished parts meet the physical requirements specified. Ends not made from heat treated material shall be heat treated to give physical properties specified on the applicable drawings.

E–1a (1). Corrosion resisting steel parts shall be made from material conforming to Specification AN–QQ–S–771. Fork and eye turnbuckle ends preferably shall be forged and/or machined from cold rolled or cold drawn steel.

E–1b. *Turnbuckle barrels.* Shall be machined from rolled brass conforming to Specification AN–QQ–B–646 or from steel conforming to Specification AN–S–14 or AN–QQ–S–684, or may be swaged from seamless brass tubing conforming to Specification AN–T–70 or from seamless steel tubing conforming to Specifications AN–T–15 or AN–WW–T–850 except that tensile strength may be 75,000 p. s. i. minimum. Turnbuckle barrels shall not be made of corrosion-resisting steel.

E–1b (1). *Internal strain.* Finished brass turnbuckle barrels fabricated by the swaging process shall withstand the tests specified in section F without showing surface cracks.

E–2. *Breaking strength.* Breaking strength of turnbuckle assemblies and component parts after plating shall be not less than the values specified on the applicable drawings.

E–3. *Bending.* Turnbuckle ends shall withstand bending through an angle of 90 degrees without failing or cracking.

E–4. *Torsion.* Two piece turnbuckle forks shall withstand the torsion loads specified in Table I applied clockwise and counterclockwise, without relative movement in the union between yoke and shank. Test shall be made in accordance with section F.

TABLE I—TORSION TEST LOADS

Size	*Torque (in lbs.)*
AN–161–8	12
AN–161–16	34
AN–161–22	84
AN–161–32	116
AN–161–46	138
AN–161–61	246
AN–161–80	411
AN–161–125	700
AN–161–175	1110

E–5. *Distortion.* The permanent increase in overall length, resulting from the application for 5 seconds of a proof load of 60 percent of the "Minimum Allowable Breaking Strength" as specified on the applicable AN Standard Drawings, shall not exceed 0.001 inch per inch in the direction of application of load.

E–6. *Interchangeability.* All component parts be interchangeable with corresponding parts furnished by the same contractor or by different contractors. Mating of component parts shall provide for proper and efficient functioning of the equipment without necessity for selective fits.

F. *Methods of sampling, inspection, and tests.* F–1. *General:*

F–1a. When inspection is conducted at the contractor's plant, all tests specified herein under testing shall be accomplished by the contractor under the supervision of the Government Inspector.

F–1b. Contractors not having laboratory facilities shall engage the services of a commercial testing laboratory satisfactory to the Inspector.

F–1c. Acceptance or approval of material during course of manufacture in no case shall be construed as a guarantee of the acceptance of the finished product.

F–2. *Reports of test.* The contractor shall maintain a record available to the Inspector, of the quantitative results of all inspection tests required by this specification. Upon request, copies of the test results shall be furnished the Inspector.

F–3. *Examination of product.* Each turnbuckle or component part shall be carefully examined to determine conformance with the requirements of this specification with respect to Materials, Workmanship, Design, and Construction. Each turnbuckle end shall be carefully examined for seams, fine cracks, or other defects after machining and before plating.

F–4. *Sampling.* A sufficient number of turnbuckles, or component parts, to insure uniformity and conformity to the specified requirements shall be selected at random from each lot for test. In small lots, at least one turnbuckle or component part shall be selected from each lot. The samples shall be plainly marked or tagged to identify them with the lot they represent.

F–4a. *Lot.* A lot shall consist of all turnbuckles or component parts of the same type, material, and dimensions produced consecutively by one machine or by one series of progressive processing machines.

F–5. Test Methods:

F–5a. *Internal strain.* A finished brass turnbuckle barrel of each size shall be immersed in an aqueous solution containing 100 g. of mercurous nitrate and 13 ml. nitric acid (sp. gr. 1.42) per liter. After 15 minutes, the specimen shall be removed and examined for cracks.

F–5b. *Breaking strength.* Samples shall be tested for maximum tensile strength in accordance with Specification QQ–M–151 and as otherwise specified herein. Provided the specimens do not fail under the specified maximum load, they shall not be further loaded to destruction.

F–5c. *Bending.* Each turnbuckle end which meets the breaking strength requirements shall be held in a square-nosed vise and bent as specified.

F–5d. *Torsion.* Two piece turnbuckle forks shall be held by passing a pin or bolt through the holes in the fork blades and the specified torque applied by suitable means.

F–6. *Distortion.* The specified proof load shall be applied to the turnbuckle barrel or end for the specified period of time. The load shall then be released and the part checked for distortion.

F–7. *Retests.* If a test specimen fails to pass any of the required tests, two more specimens from the lot shall be selected. If either of these specimens fails to pass any of the required tests, the entire lot shall be rejected. The manufacturer may be allowed to reheat-treat the entire lot before the final tests are made.

G. *Packaging, packing and marking for shipment.* G–1. *General.* The packaging, packing and marking requirements specified herein apply only to direct purchases by or direct shipments to the Government.

G–2. *Interior packaging.* Each turnbuckle shall be preserved in accordance with AN–P–13, Method IA, without the use of contact preservatives except as specified in this specification. If the turnbuckles weigh less than ½ pound each, ten of them shall be packaged in a folding carton conforming to Specification JAN–P–120, a set up box conforming to JAN–P–133, or an interior fiberboard box conforming to Specification JAN–P–108. If the turnbuckles weigh more than ½ pound each, ten of them shall be packaged in an interior fiberboard box conforming to Specification JAN–P–108.

G–3. *Exterior packing.* Unless otherwise specified, all parts shall be packed for domestic shipment. Shipping containers, insofar as possible, shall contain identical number of articles, shall be of a uniform size and shall be designed to enclose the contents in a snug, tight-fitting manner. The gross weight of the exterior shipping container when packed for shipment shall not exceed approximately 200 pounds.

G–3a. *Domestic shipment.* Unless otherwise specified, interior packages shall be packed in substantial commercial shipping containers so constructed as to insure acceptance by common or other carrier for safe transportation, at the lowest rate, to the point of delivery. Except as specified herein, the container shall conform to the requirements of Consolidated Freight Classification Rules in effect at the time of shipment. The use of corrugated or solid fiberboard having a minimum Mullen test of less than 200 pounds is prohibited. Containers shall be able to withstand storage, rehandling, and reshipment without the necessity of repacking.

G–3b. *Export shipment.* The interior packages shall be packed in an exterior shipping container in accordance with Specification JAN–P–105, "Cleated Plywood Box" or Specification JAN–P–106, "Nailed Wood Box". If plywood box is used, the plywood shall conform to Specification AN–P–72, Type A or B, Condition I. Each shipping container shall be provided with a waterproof liner in accordance with Specification JAN–P–125.

G–4. *Marking.*

G–4a. *Interior package.* Each interior package shall be durably and legibly marked with the following information in such a manner that the markings will not become damaged when the packages are opened:

Name of part.
AN part number.
AAF or Navy stock number.
Specification AN–T–19b.
Size.
Quantity contained as defined in the contract or order.
Name of contractor (and name of manufacturer if not the same).
Government order number (or contract number if order number is not assigned).

G–4b. *Exterior shipping container.* Each exterior shipping container shall be marked as specified in section H.

H. *Requirements applicable to individual departments.* H–1. The following departmental specifications of the issue in effect on date of invitation for bids shall form a part of this specification applicable to purchases by the agency indicated.

H–1a. *Army* U. S. Army Specification 94–40645, Marking; Shipment (Domestic and Export). Copies of this specification may be obtained upon application to any of the Army Air Forces activities listed in section I.

H–1b. *Navy.* Navy Shipment Marking Handbook. Copies of this handbook may be obtained upon application to the Bureau of Supplies and Accounts, Navy Department, Washington 25, D. C.

I. *Notes.* I–1. *Use.* Turnbuckles covered by this specification are intended for use in

the construction of aircraft and aircraft accessories.

I-2. *Superseding data.* This specification supersedes previous issues of Specification AN-T-19, the current issue of Navy Department Specification 12T7, and U. S. Army Specification 29-20 for Army and Navy aeronautical use, and Master Specification AN-9021 which was the original record of agreement.

I-3. *Ordering data.* Requisitions, contracts, and orders should specify the applicable AN part numbers, and whether Export Shipment packing is desired (See Section G).

I-4. *Specifications.* When requesting specifications, refer to both title and number.

I-4a. *Sources.* Copies of Army-Navy Aeronautical Specifications may be obtained upon application to the Commanding General, Air Technical Service Command, Wright Field, Dayton, Ohio; or to the Bureau of Aeronautics, Navy Department, Washington 25, D. C. Naval activities should make application to the Commanding Officer, Naval Aircraft Modification Unit, Johnsville, Pa.

NOTICE: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

(ii) The following tests, which are required, when applicable, in addition to those set forth in Specification AN-T-19, shall be conducted to substantiate the strength and reliability of finished special turnbuckle assemblies and/or safetying devices. A minimum of six samples each shall be used in conducting the tests for torsion, tension, fatigue (tensile), and fatigue (torsion).

(*a*) *Torsion.* At least one sample of each size turnbuckle assembly and safetying device shall be tested in torsion to determine that the torque necessary to overcome the turnbuckle thread friction and break the safetying device is equal to or greater than that required when the conventional safety wire is used in accordance with the safetying procedure recommended in Civil Aeronautics Manual 4[1] Section 43, Item 15.

(*b*) *Tension.* At least one sample of each size turnbuckle and safetying device assembly shall be tested to determine that the turnbuckle assembly (including safetying device) will not fail at any tensile load under the maximum (ultimate) tensile strength for which the comparable standard AN or NAS turnbuckle is rated. For this test, the sample shall consist of the turnbuckle assembly (including safetying device) with a two (2) foot length of cable appropriately attached to each terminal (end) of the turnbuckle. In making the determination, the sample shall be tested for tensile strength in accordance with Specification QQ-M-151. If the sample does not fail under the specified maximum load, it need not be tested further to destruction.

(*c*) *Vibration.* At least one sample of each of 3 representative sizes of finished turnbuckle assemblies—say, the smallest, the largest, and an intermediate size—shall be vibrated to determine that the lock wire, or other safetying device which relies upon spring action or clamping to safety the turnbuckle, can be depended upon not to jump out of place or otherwise lose its safetying properties, under vibratory conditions apt to be encountered in aircraft service. It is suggested that a cable tension load equal to 25 percent of rated ultimate cable strength and a frequency of 3600 cpm with an over-all amplitude of ⅛ inch (parallel to the axis of the hole through the barrel) for 25 hours be used for this determination.

(*d*) *Fatigue (tensile).* At least one sample of each size finished turnbuckle assembly shall be given a repeated load test, in which a load equal to ⅔ the ultimate tensile strength requirement is applied repeatedly in tension for 300 applications of the load without failure of any component part. For this test, the sample shall consist of the turnbuckle assembly (including safetying device) with a two (2) foot length of cable appropriately attached to each terminal (end) of the turnbuckle.

(*e*) *Fatigue (bending).* The safety wire used in the conventional lock wire safetying procedure recommended in CAM 4.43-15 is not considered to be reusable. If the safety device used with the special aircraft turnbuckle assembly is to be considered re-usable, at least three (3) samples of the shortest formed non-standard safety wire (or other finished safetying device) shall be tested by alternate fastening and unfastening of the wire (or other safetying device), to determine that the device will not break after repeated applications of the bending loads involved. 200 on and off cycles, simulating rough treatment apt to be experienced from aircraft mechanics should substantiate a reasonable service life. It is felt that the shortest safety wire (or other safetying device) will be subjected to the greatest bending stresses. However, if the stresses may be greater in a longer wire (or other safetying device) intended for a larger size turnbuckle, the larger size turnbuckle and the longer wire (or other safetying device) shall be used for this test.

(*f*) *Fatigue (torsion).* At least one sample of each size finished turnbuckle assembly and/or safetying device shall be given a repeated load test in which a load equal to ⅔ the torque (determined in test No. 1 above) required to overcome the turnbuckle thread friction and break the conventional safety wire (CAM 4.43-15) is applied in torsion first in one direction and then reversed for 3,000 complete cycles of reversal without failure of any component part.

(2) *Application.* Special turnbuckle assemblies and/or safetying devices complying with the specifications appearing in this order are hereby approved for use in civil aircraft. Special turnbuckle assemblies and/or safetying devices already approved by the Administrator, and those which may be approved as parts of aircraft designs, may continue to be used for the purposes for which approved.

(c) *Specific instructions*—(1) *Marking.* In addition to the identification information required in the referenced specification, the container for each special turnbuckle assembly and/or safetying device shall be permanently marked with the Technical Standard Order designation, CAA-TSO-C21, to identify the special turnbuckle assembly and/or safetying device as meeting the requirements of this order in accordance with the manufacturer's statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for special turnbuckle assemblies and/or safetying devices have been met.

(2) *Data requirements.* None.

(3) *Effective date.* After October 1, 1949, specifications contained in this order will constitute the basis for Civil Aeronautics Administration approval of special turnbuckle assemblies and/or safetying devices for use in certificated aircraft.

(4) *Deviations.* Requests for deviation from, or waiver of, the requirements of this order, which affect the basic airworthiness of the component, should be submitted for approval by the Chief, Aircraft Division, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest Regional Office of the Civil Aeronautics Administration, Attn: Chief, Aircraft Division.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Division, Attn: W-298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the special turnbuckle assemblies and/or safetying devices to be produced by him meet the minimum safety requirements established in this order. Immediately thereafter distribution of the special turnbuckle assemblies and/or safetying devices conforming with the terms of this order may be started and continued.

(ii) The prescribed identification on the special turnbuckle and/or safetying devices does not relieve the aircraft manufacturer or owner of responsibility for the proper application of the special turnbuckle assemblies and/or safetying devices in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this order are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Staff, Washington 25, D. C.

[1] Copies may be obtained from the Government Printing Office (GPO), Washington 25, D. C., at 45¢ per copy.

§ 514.22 *Technical Standard Order C22a: "Safety Belts"*— (a) *Introduction.* (1) Under section 601 of the Civil Aeronautics Act of 1938, as amended, and Parts 3, 4a, 4b, 6 and 15 of this title issued pursuant thereto, the Administrator of Civil Aeronautics is authorized to adopt standards for safety belts intended for use in civil aircraft. In adopting these standards, consideration has been given to existing Government and industry standards for the minimum strength and performance requirements for safety belts intended for use in civil aircraft. This Technical Standard Order is intended to serve as a criterion by which the product manufacturer may obtain Civil Aeronautics Administration approval of his safety belts. Aircraft manufacturers may also obtain approval of safety belts as part of their aircraft design. Such belts shall comply with the strength and performance requirements for safety belts stated herein, and the approval thereof will be recognized by all Civil Aeronautics Administration representatives.

(b) *Directive*—(1) *Provision.* (i) The strength and performance requirements for safety belts as set forth in sections 3.1, 4.1 and 4.3 of National Aircraft Standards Specification NAS 802, Revision 1, dated May 15, 1950,[1] stated below, are hereby, established as minimum safety standards for safety belts intended for use in civil aircraft, except that, for the purpose of this Technical Standard Order, the strengths specified in 4.1.1 are hereby amended to read 1500 pounds and 3000 pounds, respectively, instead of 3000 pounds and 6000 pounds.

1. *Applicable specifications.*

1.1 The latest issue and amendment of the following documents are made a part of this specification by reference to the applicable sections hereinafter noted.

1.1.1 *Aeronautical Materials Specifications (SAE).* AMS 3852, Flame-Resistant Properties for Aircraft Materials.

2. *Types.*

2.1 This specification covers all types of safety belts for civil aircraft use.

3. *Material and workmanship.*

3.1 Materials shall be of a quality which experience and/or tests have conclusively demonstrated to be suitable for use in aircraft safety belts. Workmanship shall be consistent with high-grade aircraft manufacturing practice.

3.1.1 *Strength of webbing materials.* The rated minimum breaking strength of the webbing to be used in belts shall be at least 50% greater than the rated strength of the complete belt assembly as specified in section 4.1.1 when tested under standard test conditions (see 4.3.1.2).

3.1.2 *Age of webbing.* No webbing which is more than six (6) months old from date of weaving shall be used in the manufacture or fabrication of a safety belt assembly unless the webbing has been retested in accordance with section 4.3.1.2.

3.1.3 *Protection.* All portions of the belt assembly shall be protected against deterioration or loss of strength in service due to weathering, corrosion, abrasion from sharp corners, or other causes where the type of material requires such protection. Belt webbing which is subject to effects of mildew shall be treated against mildew.

3.1.4 *Fire precaution.* The webbing and all other materials used in the belt assembly shall have flame-resistant properties as specified by Aeronautical Material Specification AMS 3852.

4. *Detail requirements.*

4.1 *Design.*

4.1.1 *Rated strength of belt assembly.* The safety belt assembly, intended for use with a seat designed for single occupancy, including webbing, release mechanism, and all parts integral with the belt which are necessary for installing the belt, shall be designed to withstand at least a 3000 pound load applied in alignment with the anchored belt according to the test requirements specified in section 4.3.2.1. If designed for double occupancy, the rated strength shall be increased to at least 6000 pounds. The rated strength of the safety belt assembly shall be suitably marked upon each half of the safety belt assembly.

4.1.2 *Safety belt release mechanism.* The safety belt assembly shall be adjustable and shall include an easily operable quick-release mechanism which will enable the wearer to release himself easily under a load simulating the wearer hanging in the belt after an application of a load that will impose a tensile loading on the belt webbing at least equal to the rated strength of the belt assembly as defined in section 4.1.1.

4.1.3 *Width of webbing.* The width of the safety belt webbing shall not be less than 2 inches.

4.2 *Marking.* Each half of the belt assembly shall have legibly and permanently marked on or attached to it a nameplate or identification label bearing the following information:

Manufacturer's name.

Model number or model name.

Date of manufacture of the safety belt assembly (note section 3.1.2).

Rated strength of safety belt assembly.

National Aircraft Standard Number (NAS 802).

4.3 *Qualification tests.*

4.3.1 *Webbing tests.*

4.3.1.1 *Flame resistance test.* Specimens of the belt webbing shall pass the tests outlined in AMS 3852, Flame-Resistant Properties of Aircraft Material.

4.3.1.2 *Tensile test; rated minimum breaking strength.* After all special finishing processes which may be required have been accomplished to provide for mildew and flame resistance, three samples of webbing shall be prepared for testing. It is desirable that the three samples be taken at random from different rolls or lots of the type of webbing intended to be used in the manufacture of the safety belt being tested. The tests shall be conducted when each sample is in moisture equilibrium with an atmosphere having a relative humidity of 65% and a temperature of 70° F. A tolerance of plus or minus 2% is permitted in relative humidity and plus 10° F. in temperature. The samples shall be tested in a suitable textile testing machine acceptable to the manufacturer. The samples shall be mounted in the machine when the heads are 10 inches apart. The heads shall separate at the rate of 4 inches per minute maximum under no load. Each test sample of the webbing shall withstand a load at least equal to its rated minimum breaking strength without failure for at least three seconds.

4.3.2 *Complete belt assembly tests.*

4.3.2.1 *Tensile test; rated strength.* Three identical samples of a safety belt assembly shall be tested to determine the rated strength. If the design incorporates adjustment adapters, the adapters shall be positioned approximately halfway between the buckle and the end fittings. If a cam-type buckle is used, about 10 inches of the free end of the webbing shall extend beyond the cam when the latch is in the locked position. The tests may be conducted under prevailing atmospheric conditions. The ends of the assembly shall be attached to the stationary and movable heads of the testing machine by means of adequate fittings. The heads shall separate at the rate of 4 inches per minute maximum under no load. The buckle shall be in a locked position and the entire assembly should be in axial alignment with the heads of the testing machine. All precautions shall be taken to prevent eccentric loading. Each sample shall be pulled at least to the load designated in 4.1.1 as the rated strength. After removal of the load, the webbing and stitching shall show no signs of failure or weakening and the metal components shall show no permanent deformation which will result in malfunctioning of the belt assembly. The total slippage in the adjusting arrangement or the quick-release mechanism shall not exceed 1 inch.

4.3.2.2 *Functional test; release mechanism.* At least three identical samples of a safety belt assembly shall be tested to determine the functional characteristics of the quick-release mechanism. (NOTE.—It is desirable that the sample safety belts used in performing the tensile tests for rated strength be used in this test. However, the samples may be new, untested assemblies if desired by the test witnesses.) The safety belt assemblies shall be adjusted to approximately 36 inches in length, this distance being measured from the bolt hole in one end fitting to the bolt hole in the other.

Each safety belt sample in turn shall then be tested in a test jig, the end fittings being attached to jig anchorage fittings located 20 inches apart horizontally and so positioned as to suspend the belt in a vertical plane. It shall be possible to apply the required loading vertically downward through a 6-inch thick semicircular wooden form having a radius of not more than 8 inches. The curved portion of this test form may provide a cut-out to accommodate the belt buckle and may have installed on it padding to simulate the wearer's clothes. The tests may be conducted under prevailing atmospheric conditions.

A static load of 1.9 times the rated strength of the belt assembly shall be applied to the belt assembly through the wooden form for a one- or two-person belt and then relieved to 250 pounds for a one-person belt or 500 pounds for a two-person belt.

The quick-release mechanism shall then be operable at no more than a 45-pound pull applied in the direction which would normally actuate the release. The latter measurement may be taken by using a small precision hand scale. After removal of the loads, the quick-release mechanism shall show no signs of failure or sufficient permanent deformation to prevent the operation of the release. The total slippage in the adjusting arrangement or the quick-release mechanism shall not exceed 1 inch.

(2) *Application.* (i) Safety belts complying with the specifications appearing in this section are hereby approved for all civil aircraft. Safety belts already approved by the Administrator may continue to be installed in aircraft except that (*a*) all safety belts installed in aircraft manufactured on or after January 1, 1951, and (*b*) all safety belts installed as original or replacement equipment in aircraft on or after July 1, 1951, shall be safety belts which comply with the strength and performance requirements of this Technical Standard Order.

(c) *Specific instructions*—(1) *Marking.* (i) In addition to the identification required in the referenced specification, except that the NAS specification number NAS 802 is not required, each half of each safety belt shall be permanently marked with the Technical Standard

[1] Copies may be obtained from the American Aeronautical Forum, 527 Washington Loan and Trust Building, Washington 4, D. C.

Order designation, CAA–TSO–C22, to identify the safety belt as meeting the requirements of this section in accordance with the manufacturer's statement of conformance outlined in subparagraph (5) of this paragraph. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for safety belts have been met.

(2) *Data requirements.* (i) None.

(3) *Effective date.* (i) After July 1, 1950, specifications contained in this section will constitute the basis for Civil Aeronautics Administration approval of safety belts for use in certificated aircraft.

(4) *Deviations.* (i) Requests for deviation from, or waiver of, the requirements of this section, which affect the basic airworthiness of the component, should be submitted for approval by the Chief, Aircraft Division, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest Regional Office of the Civil Aeronautics Administration, Attention: Chief, Aircraft Division.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Division, Attention: W–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the safety belts to be produced by him meet the minimum safety standards established in this section. Immediately thereafter, distribution of the safety belts conforming with the terms of this section may be started and continued.

(ii) The prescribed identification on the safety belts does not relieve the aircraft manufacturer or owner of responsibility for the proper installation of the safety belts in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this section are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Office, Washington 25, D. C.

§ 514.23 *Technical Standard Order C23: "Parachutes"*—(a) *Introduction.* (1) Under section 601 of the Civil Aeronautics Act of 1938, as amended, and Parts 3, 4a, 4b, and 15 of this title issued pursuant thereto, the Administrator of Civil Aeronautics is authorized to adopt standards for parachutes intended for use in civil aircraft. In adopting these standards, consideration has been given to existing Government and industry standards for the minimum performance and safety requirements for parachutes intended for use in civil aircraft. This Technical Standard Order is intended to serve as a criterion by which the product manufacturer may obtain Civil Aeronautics Administration approval of his parachute.

(b) *Directive*—(1) *Provision.* (i) The performance requirements for parachutes, as set forth in section 4.3 through section 4.38 of the National Aircraft Standards Specification NAS 804 dated August 24, 1949,[1] stated below, are hereby established as minimum performance standards for parachutes intended for use in civil aircraft.

1. *Applicable specifications.*

1.1 None.

2. *Types.*

2.1 This specification covers two types of man-carrying parachutes for use in certificated civil aircraft:

Standard type parachute.

Low speed type parachute (up to 150 miles per hour).

3. *Material and workmanship.*

3.1 Materials shall be of a quality which experience and/or tests have conclusively demonstrated to be suitable for use in parachutes. Workmanship shall be consistent with high-grade parachute manufacturing practice.

3.1.1 *Canopy material.* The fabric used in the canopy construction shall be free from harmful gums, starches and other foreign material. It shall also be free from avoidable imperfections in manufacture and from defects or blemishes affecting its strength or durability and shall have been finished without application of excessive heat. The canopy material shall have sufficient resilience to insure proper opening of the canopy under conditions outlined in 4.3.5.

3.1.2 *Fitting materials.* Fittings shall be fabricated from carbon steel, alloy steel, or corrosion-resisting material. Fittings made from metals that are not corrosion-resisting shall be plated or otherwise protected, to resist corrosion during the normal life of the parachute. The use of dissimilar metals, especially brass, copper, or steel in intimate metal-to-metal contact with aluminum or aluminum alloy, shall be avoided, wherever possible.

4. *Detail requirements.*

4.1 *Design and construction.*

4.1.1 *Fittings.* All fittings shall be designed to carry their full rated load without yielding.

4.1.2 *Suspension lines.* All suspension lines of a given model parachute shall be marked under equal tension to show points of attachment.

4.1.3 *Stitching.* Stitching shall be of a type that will not ravel when broken.

4.1.4 *Rip cord.* The rip cord, including joints between the handle and the release, shall be designed to withstand the tension test load of 4.3.1.

4.1.5 *Pack opening device.* No more than 22 pounds pull shall be required to cause the positive and quick functioning of the pack opening device.

4.1.6 *Harness release.* The harness shall be so constructed that the rider can release himself and drop clear in case of a water landing, but a quick-attachable or quick-releasing device between the harness and the parachute is not mandatory.

4.2 *Marking.*

4.2.1 *Pack.* The following information shall be legibly and permanently marked on or attached to the outside of the parachute pack by use of a name plate, identification label or stenciled letters:

Manufacturer's name.
Model number or model name.[1]
Parachute serial number.
Date of manufacture.
National Aircraft Standard Number (NAS804).

4.2.2 *Canopy.* Each parachute canopy shall be legibly and permanently marked, preferably adjacent to the skirt, with the same information as in 4.2.1.

4.2.3 *Harness.* The parachute model number or model name and date of manufacture shall be stenciled on all harnesses. This marking shall be placed inside the back strap of the harness or other suitable location where it will be subject to minimum of obliteration.

4.2.4 *Inspection data pocket.* Each parachute outfit shall be provided with an inner and an outer pocket for keeping a record card containing space for recording the date of repacking or repair and the rigger's name and serial number. The inner pocket shall be located in the center of the packed container, tray or frame and the outer pocket placed externally in an easily accessible position. If the inner record card can be read from the outside of the pack because of the use of transparent materials, only the inner pocket need be provided.

4.3 *Qualification tests.* 100% performance in qualification tests 4.3.1 through 4.3.8 is required.

4.3.1 *Rip cord tension test.* The rip cord, including joints between the handle and the release, shall not fail under a straight tension test load of 300 pounds applied for not less than three seconds.

4.3.2 *Pull test; pack opening device.* The pack opening device shall be tested by use of an accurate spring balance to indicate its positive and quick-functioning with no more than 22 pounds pull.

4.3.3 *Functional test (normal pack).* Twelve drops at least six of which shall be from an airplane with a 170-pound dummy man, from an altitude of not more than 500 feet. The indicated air speed at the time of release shall be 70 miles per hour. No twists shall purposely be packed in the suspension lines. The parachute must be fully open within three seconds from time of release.

4.3.4 *Functional test (twisted lines).* Five drops with a 170-pound dummy man, from an altitude of not more than 500 feet. The indicated air speed at the time of release shall be 70 miles per hour. Three twists shall purposely be packed in the suspension lines near the skirt. The parachute must be fully open within four seconds from time of release.

4.3.5 *Compressed pack test.* This test is required only when canopy materials other than pongee, silk or nylon are used (Ref. 3.1.1). Three drops with the conditions stated in 4.3.3 except that prior to the tests the parachutes completely packed shall be subjected continuously to a 200-pound weight for 400 hours and then dropped without being repacked.

4.3.6 *Strength test.*

4.3.6.1 *Standard type parachute.* Three drops with a parachute of the same type at an altitude of not more than 500 feet shall be made with a dummy weight and indicated air speed to give the equivalent of 5,000 lbs. shock load. (See Table I.) No twists shall purposely be packed in the suspension lines. The weight shall be attached to the harness. No external shock absorbers or material which may act as such shall be permitted. The parachute shall show no failure of any material.

[1] Copies may be obtained from the American Aeronautical Forum, 527 Washington Loan and Trust Building, Washington 4, D. C.

[1] Special designation or identification of low speed type parachutes must be indicated on the outside pack by stenciling in red letters one inch high the following: "Low Speed Parachute" and in red letters one-half inch high, "Limited to Use in Airplane Under 150 MPH."

TABLE I—LAUNCHING SPEEDS AND TOTAL WEIGHTS FOR APPROX. 5,000 LBS. SHOCK LOAD[1]

Speed, miles per hour	*Total weight (including chute), pounds*
150	660
175	500
200	400
225	325
250	275
275	225
300	200
325	175
350	160
375	150

[1] Data computed for 28 ft. Standard Flat-Type Parachute based on USAF Parachute Handbook Section V.

4.3.6.2. *Low speed type parachute.* Three drops with a parachute of the same type at an altitude of not more than 500 feet shall be made with a dummy weight and indicated air speed to give the equivalent of 3,000 lbs. shock load. No twists shall purposely be packed in the suspension lines. The weight shall be attached to the harness. No external shock absorbers or material which may act as such shall be permitted. The parachute shall show no failure of any material.

TABLE II—LAUNCHING SPEEDS FOR TOTAL WEIGHTS FOR APPROX. 3,000 LBS. SHOCK LOAD[1]

Speed, miles per hour	*Total weight (including chute), pounds*
100	750
125	525
150	375
175	300
200	235
225	200

[1] Data computed for 28 ft. Standard Flat-Type Parachute based on USAF Parachute Handbook Section V.

4.3.7 *Live drop tests.* Two live drop tests from an airplane with a man weighing approximately 170 pounds, including the weight of an additional certificated auxiliary parachute, from an altitude of 2000 feet on a comparatively still day. The rider must suffer no discomfort from the opening shock and must be able to disengage himself, unaided from the harness after landing. For this test the standard harness may be altered to permit attachment of an auxiliary parachute provided that such alteration does not interfere with the normal operation of the parachute and harness equipment being tested.

4.3.8 *Rate of descent test.* At least six drops from an airplane with a 170-pound dummy man. The average rate of descent shall not exceed 21 feet per second for the last 100 feet under standard sea level altitude conditions. A method shall be employed for direct and accurate measurement of rate of descent for the last 100 feet, such as the use of a weighted cord or cable by which the descent may be timed from the time of ground impact of the weight to ground impact of the parachute.

(ii) Moreover, a parachute to be used as an auxiliary parachute in combination with a standard parachute shall comply with all the provisions of this section and the following:

(*a*) The auxiliary parachute shall be designed for use in combination with a specific main parachute and not for the auxiliary parachute alone.

(*b*) The rate of descent of the auxiliary parachute shall not exceed 25 feet per second and, therefore, the provisions of NAS 804 paragraph 4.3.8 do not apply.

(*c*) The auxiliary parachute and its pack shall be marked "Auxiliary Parachute".

(2) *Application.* (i) Parachutes complying with the specifications appearing in this section are hereby approved for use in civil aircraft. Parachutes approved by the Administrator prior to the effective date of this section may continue to be used.

(ii) If, within nine months after the effective date of this section, a major change is made in the type or model which requires drop testing to demonstrate that the performance characteristics of the parachute type or model are not adversely affected, the revised parachute shall meet the specifications contained in this section.

(c) *Specific instructions*—(1) *Marking.* (i) In addition to the identification information required in the referenced specification, (except that the NAS 804 number is not required) each parachute shall be permanently marked with the Technical Standard Order designation, CAA–TSO–C23, to identify the parachute as meeting the requirements of this section in accordance with the manufacturers' statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for parachutes have been met.

(2) *Data requirements.* (i) None.

(3) *Effective date.* (i) After October 10, 1950, specifications contained in this Order will constitute the basis for Civil Aeronautics Administration approval of parachutes for use in civil aircraft.

(4) *Deviations.* (i) Requests for deviation from, or waiver of, the requirements of this section, which affect the basic airworthiness of the component, should be submitted for approval by Chief, Aircraft Division, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest Regional Office of the Civil Aeronautics Administration, Attention: Chief, Aircraft Division.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Division, Attention: W–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the parachutes to be produced by him meet the minimum safety requirements established in this section. Immediately thereafter distribution of the parachutes conforming with the terms of this section may be started and continued.

(ii) If complaints of nonconformance with the requirements of this section are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iii) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Office, Washington 25, D. C.

§ 514.24 *Technical Standard Order C24: "Landing Flares"*—(a) *Introduction.* (1) Under section 601 of the Civil Aeronautics Act of 1938, as amended, and Parts 3, 4a, 4b, 6 and 15 of this title issued pursuant thereto, the Administrator of Civil Aeronautics is authorized to adopt standards for landing flares intended for use in civil aircraft. In adopting these standards, consideration has been given to existing Government and industry standards for the minimum performance requirements for landing flares intended for use in civil aircraft. This Technical Standard Order is intended to serve as a criterion by which the product manufacturer may obtain Civil Aeronautics Administration approval of his landing flares.

(b) *Directive*—(1) *Provision.* (i) The performance requirements for landing flares as set forth in sections 4.1 and 4.3 of National Aircraft Standards Specification NAS 805 dated February 15, 1950,[1] stated below, are hereby established as minimum performance requirements for landing flares intended for use in civil aircraft.

1. *Applicable specifications.*

1.1 None.

2. *Types.*

2.1 This specification covers four types of landing flares suitable for use in certificated civil aircraft.

Class 1.
Class 1A.
Class 2.
Class 3.

3. *Material and workmanship.*

3.1 Materials shall be of a quality which experience and/or tests have conclusively demonstrated to be suitable for use in landing flares. Workmanship shall be consistent with high-grade landing flare manufacturing practice.

3.2 The flare body should be so sealed as to reduce to a minimum deterioration of the ignition element and to increase, insofar as possible the service life of the unit. All metal parts should be suitably protected against corrosion. All fabric except nylon material should be mildew-proofed.

4. *Detail requirements.*

4.1 *Design and construction.*

4.1.1 *Light duration.* Flares shall have a minimum light duration as follows:

Classes 1 and 1A—3 minutes.
Class 2—1½ minutes.
Class 3—1 minute.

4.1.2 *Light intensity.* Flares shall have a minimum light intensity as follows:

Classes 1 and 1A—300,000 candlepower.
Class 2—110,000 candlepower.
Class 3—70,000 candlepower.

4.1.3 *Rate of descent.* Flares shall have an average rate of descent not greater than 550 feet per minute.

4.1.4 *Delaying fuse.* Class 1A flares shall incorporate a 90 second plus or minus 10 seconds delaying fuse.

4.1.5 *Firing cord.* Flares incorporating a manual firing cord actuating cable shall have cord length not less than 20 feet.

4.2 *Marking and instructions.*

4.2.1 Each flare shall carry the following information legibly marked on or attached to the flare and the flare container:

Manufacturer's name.
Model number or model name.
Instructions for installation procedures and safety precautions.
Date of manufacture (month and year).
National Aircraft Standard Number NAS 805.

[1] Copies may be obtained from the American Aeronautical Forum, 527 Washington Loan and Trust Building, Washington 4, D. C.

4.3 *Qualification tests.* The following qualification tests shall be conducted.

4.3.1 *Functional tests.* Five flares of each model shall be installed in an airplane according to the manufacturer's instructions and shall be dropped from an altitude adequate to insure complete burning of the flare prior to ground contact.

4.3.1.1 In the event that there is one failure out of the five flares subjected to the functional tests, five additional flares shall be subjected to the functional tests.

4.3.1.2 Failure of two or more flares out of the ten dropped shall be sufficient grounds for rejection. The flare model will be considered to be satisfactory only if all five original flares function satisfactorily or in the event of one failure in the original five, if the second five function satisfactorily.

(2) *Application.* (i) Landing flares complying with the specifications appearing in this Technical Standard Order are hereby approved for use in all aircraft. Landing flares already approved by the Administrator may continue to be installed in aircraft.

(ii) If an installation change involving a new type or model landing flare is made within nine months after the effective date of this section, previously approved types of landing flares may be installed. However, in any such change made after the nine-month period, new types of landing flares installed in aircraft shall meet the specifications contained herein.

(c) *Specific instructions*—(1) *Marking.* (i) In addition to the identification information required in the referenced specification, except that the NAS 805 number is not required) each flare shall be permanently marked with the Technical Standard Order designation, CAA–TSO–C24, to identify the landing flare as meeting the requirements of this section in accordance with the manufacturers' statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for landing flares have been met.

(2) *Data requirements.* (i) None.

(3) *Effective date.* (i) After October 10, 1950, specifications contained in this section will constitute the basis for Civil Aeronautics Administration approval of landing flares for use in civil aircraft.

(4) *Deviations.* (i) Requests for deviation from, or waiver of, the requirements of this section, which affect the basic airworthiness of the component, should be submitted for approval by the Chief, Aircraft Division, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest Regional Office of the Civil Aeronautics Administration, Attention: Chief, Aircraft Division.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Division, Attention: W–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the landing flares to be produced by him meet the minimum safety standards established in this section. Immediately thereafter distribution of the landing flares conforming with the terms of this section may be started and continued.

(ii) The prescribed identification on the landing flares does not relieve the aircraft manufacturer or owner of responsibility for the proper installation of the landing flares in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this section are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Office, Washington 25, D. C.

§ 514.25 *Technical Standard Order C25: "Aircraft Seats and Berths"*—(a) *Introduction.* (1) Under section 601 of the Civil Aeronautics Act of 1938, as amended, and Parts 3, 4a and 4b of this title issued pursuant thereto, the Administrator of Civil Aeronautics is authorized to adopt standards for seats and berths intended for installation in civil aircraft. In adopting these standards, considerations has been given to existing Government and industry standards for the minimum strength and performance requirements for seats and berths intended for use in civil aircraft. This Technical Standard Order is intended to serve as a criterion by which the product manufacturer may obtain Civil Aeronautics Administration approval of seats and berths. Aircraft manufacturers may also obtain approval of seats and berths as part of their aircraft design and should include them on the aircraft drawings. Such seats and berths shall comply with the strength and performance requirements for seats and berths stated herein, and approval thereof will be recognized by all Civil Aeronautics Administration representatives.

(b) *Directive*—(1) *Provision.* (i) The performance requirements as set forth in section 3, subsections 4.1.1, 4.1.2, 4.1.3 and 4.1.5 and section 4.3 of National Aircraft Standards Specification 806 dated April 1, 1950,[1] stated below, together with provisions and exceptions noted below are hereby established as minimum safety standards for seats and berths intended for use in all civil aircraft except rotorcraft.

1. *Applicable specifications.*

1.1 The latest issue and amendment of the following documents are made a part of this specification by reference to the applicable sections hereinafter noted.

1.1.1 *CAA Safety Regulation Release No. 259,* "Compliance of Equipment and Materials Used in Air Carrier Aircraft with Fire Prevention Requirements".

2. *Types.*

2.1 This specification covers all types of crew and passenger seats and berths for civil aircraft use in the following categories:

Type I. Transport.

Type II. Normal—Utility.

Type III. Acrobatic.

3. *Material and workmanship.*

3.1 Materials shall be of a quality which experience and/or tests have conclusively demonstrated to be suitable for use in aircraft seats and berths. Workmanship shall be consistent with high-grade aircraft manufacturing practice.

3.1.1 *Protection.* All members of the structure shall be suitably protected against deterioration or loss of strength in service due to weathering, corrosion, abrasion or other causes where the type of material requires such protection.

3.1.2 *Fire precaution.* The covering and upholstery and all other exposed material used in the seat or berth shall have flame-resistant properties as specified by CAA Safety Regulation Release No. 259. If ashtrays are installed in, or attached to, the seat or berth, they shall be of a self-contained, completely removable type.

4. *Detail requirements.*

4.1 *Design.*

4.1.1 *General.* The seat shall be designed so that in any of its adjustable positions and when installed facing in a specified direction or directions, it will provide protection for the occupant in a manner compatible with the function for which the seat is designed, i. e., pilot, cabin attendant, check pilot, passenger, and the like.

4.1.2 *Strength.* All seats and berths intended for single occupancy shall be designed for the ultimate loads specified in Table I to which occupants are subjected. The loads shall be considered as acting separately and shall be based on a passenger weight of 170 pounds for Type I and 190 pounds (includes parachute) for Types II and III. The sideward, upward and downward loads, as specified in Table I, are the minimums corresponding to flight and ground load conditions prescribed in the applicable Civil Air Regulations. The forward loads correspond to the emergency conditions prescribed in the applicable Civil Air Regulations. For seats intended for multiple occupancy the loads must be increased accordingly. Ultimate loads are 1.5 times the limit loads.

TABLE I

Force direction	Type I	Type II[1]	Type III
Forward	1,020 pounds (6.0 g)	1,710 pounds (9.0 g)	1,710 pounds (9.0 g).
Sideward	255 pounds (1.5 g)	285 pounds (1.5 g)	285 pounds (1.5 g).
Upward	340 pounds (2.0 g)	570 pounds (3.0 g)	855 pounds (4.5 g).
Downward	765 pounds (4.5 g)	1,254 pounds (6.6 g)	1,710 pounds (9.0 g).

[1] Civil Air Regulations require use of parachute in utility category aircraft operated in acrobatic flight when carrying passengers.

4.1.2.1 *Ultimate load strength.* The seat or berth in any of its adjustable positions while installed, facing in a specified direction or directions, when occupied by maximum number of occupants, shall be capable of withstanding ultimate loads without failure for at least three (3) seconds.

4.1.2.2 *Limit load strength.* The seat or berth in any of its adjustable positions shall be capable of withstanding the limit loads without suffering detrimental permanent deformation. At all loads up to these limit loads the deformation shall be such as not

[1] Copies may be obtained from the American Aeronautical Forum, 527 Washington Loan & Trust Building, Washington 4, D. C.

to interfere with safe operation of the airplane. (Note: this limit load requirement is not applicable to the forward loading since it is an emergency condition).

4.1.3 *Safety belt anchorages.* When anchorages for safety belts are provided they shall be of a type which will permit self-aligning of the belt and fitting.

4.1.4 *Shoulder harness anchorages.* When anchorages for shoulder harneses are provided, they shall be so located as to ensure they will be above the shoulder level of the occupant.

4.1.5 *Projections.* The surfaces of the seat shall be free fom sharp edges or any projections which may chafe the safety belt or harness webbing. Projections, sharp corners, and other hazardous features, against which occupants may be thrown during a crash, shall be avoided insofar as possible. Any unavoidable features of this nature shall be adequately padded.

4.2 *Marking.* Each seat or berth shall be legibly and permanently marked with the following information:

Manufacturer's name.
Model number or model name.
Seat type.
Serial number or date of manufacture.
National Aircraft Standard Number (NAS ----).

4.3 *Qualification tests.* Tests shall be conducted as necessary to demonstrate the following: (a) that seats or berths manufactured in accordance with this specification are capable of supporting the limit loads without detrimental permanent deformation; (b) that, at all loads up to limit loads, the deformation shall be such as not to interfere with the safe operation of the aircraft; and (c) that the structure is capable of supporting the ultimate loads specified herein without failure for at least 3 seconds.

4.3.1 *Detail qualification test requirements.* The seat or berth shall be loaded in tests such that the loads imposed on the seat or berth by the occupant(s) in conjunction with the safety belt or belts and their attachments are accurately simulated by means of a block or frame or dummy, said block or frame or dummy being restrained in the seat or berth by the belt or belts attached to their fittings. The tests may be conducted in a jig simulating installation conditions.

4.3.1.1 When a seat or berth is to be installed or adjusts to face in other than the forward direction, sufficient tests shall be made to substantiate the seat strength for all intended positions.

4.3.1.2 When testing for a particular load condition of a vertically or horizontally adjustable seat, the most critical seat position associated with that load shall be used for the test.

4.3.1.3 Where the safety belt or belts or harness are not attached to the seat or berth structure, the seat or berth shall be tested for the loads which would be imposed on such installation.

4.3.2 *Flame-resistance test of seat covers.* Specimens of the seat covering and upholstery shall meet the tests outlined in CAA Safety Regulation Release No. 259.

(*a*) In complying with sub-section 4.1.1, Type II and Type III seats shall be designed to accommodate passengers wearing parachutes, except that Type II seats designed specifically for Normal Category Aircraft need not comply with this requirement but shall be identified in the marking required by the section on "Marking" of this section as "For Normal Category Aircraft Only."

(*b*) The ultimate loads corresponding to the aircraft reduced weight gust load factor or the airplane designer's special requirements may exceed the ultimate down loads for Type I and Type II seats specified in sub-section 4.1.2 of NAS 806. For the purpose of this section, in order to provide for such loading conditions, the ultimate down loads specified in table I of 4.1.2 for Type I and Type II seats shall be 1,000 pounds (6g) and 1,330 (7 g) pounds, respectively, instead of 765 pounds and 1,254 pounds.

(*c*) To insure that pilot and co-pilot seats will provide for the rearward loads resulting from the application of pilot forces to the flight controls, such seats shall withstand the following rearward loads:

Type I seats— 450 pounds.
Type II and Type III seats—300 pounds for aircraft weighing 5,000 pounds or under, and 450 pounds for aircraft weighing over 5,000 pounds.

The loads shall be applied 8 inches above the intersection of the seat back with the seat bottom.

(*d*) The weight of the seat or berth times the appropriate "g" value shall be added to the design ultimate loads specified in 2 above and in sub-section 4.1.2 of NAS 806.

(*e*) For the purpose of this section, 4.3. (c) of NAS 806 should read: "that the structure is capable of supporting without failure for at least 3 seconds the ultimate loads specified in this section when applied separately."

(2) *Application* (i) Seats and berths complying with the specifications appearing in this section are hereby approved for all civil aircraft, except rotorcraft. Seats and berths already approved by the Administrator prior to the effective date of this Order may continue to be installed in aircraft for which they were approved, and installed in aircraft:

(*a*) For which an application for original type certificate is made prior to the effective date of this section;

(*b*) The prototype of which is flown within one year after the effective date of this section, and

(*c*) The prototype of which is not flown within one year after the effective date of this section if due to causes beyond the applicant's control.

(ii) If a major alteration, involving a change in type or model of seat or berth, is made in the installation within nine months after the effective date of this section previously approved seats and berths may be installed. However, in any such change made after the nine-month period, new seats or berths installed in aircraft shall meet the specifications contained in this section.

(c) *Specific instructions*—(1) *Marking.* (i) In addition to the identification required in section 1 of the directive of this section and in section 4.2 of Specification NAS 806, except that the number NAS 806 is not required, each seat and berth shall be permanently marked with the Technical Standard Order designation CAA–TSO–C25, to identify the seat and berth as meeting the requirements of this section in accordance with the manufacturer's statement of conformance outlined below. This identification will be accepted by the Civil Aeronautics Administration as evidence that the established minimum safety requirements for seats and berths have been met.

(2) *Data requirements.* (i) None.

(3) *Effective date.* (i) After January 1, 1951, specifications contained in this section will constitute the basis for Civil Aeronautics Administration approval of seats and berths for use in certificated aircraft.

(4) *Deviations.* (i) Requests for deviation from, or waiver of, the requirements of this section, which affect the basic airworthiness of the component, should be submitted for approval by the Chief, Aircraft Division, Office of Aviation Safety, Civil Aeronautics Administration. These requests should be addressed to the nearest Regional Office of the Civil Aeronautics Administration, Attention: Chief, Aircraft Division.

(5) *Conformance.* (i) The manufacturer shall furnish to the Civil Aeronautics Administration, Aircraft Division, Attention: W–298, Washington 25, D. C., a written statement of conformance signed by a responsible official of his company, setting forth that the seats and berths to be produced by him meet the minimum safety standards established in this section. Immediately thereafter, distribution of the seats and berths conforming with the terms of this section may be started and continued.

(ii) The prescribed identification on the seats and berths does not relieve the aircraft manufacturer or owner of responsibility for the proper installation of the seats and berths in his aircraft, nor waive any of the requirements concerning type certification of the aircraft in accordance with existing Civil Air Regulations.

(iii) If complaints of nonconformance with the requirements of this section are brought to the attention of the Civil Aeronautics Administration, and investigation indicates that such complaints are justified, the Administrator will take appropriate action to restrict the use of the product involved.

(iv) Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Aviation Information Office, Washington 25, D. C.

TITLE 32—NATIONAL DEFENSE

Chapter VI—Department of the Navy

Subchapter B—Executive Orders, Proclamations, and Public Land Orders Applicable to the Navy

PART 702—TABULATION OF EXECUTIVE ORDERS, PROCLAMATIONS, AND PUBLIC LAND ORDERS APPLICABLE TO THE NAVY

MISCELLANEOUS AMENDMENTS

Correction

In F. R. Doc. 51–11891, appearing at page 10200 of the issue for Saturday, October 6, 1951, the chapter heading should read as set forth above.

TITLE 32A—NATIONAL DEFENSE, APPENDIX

Chapter III—Office of Price Stabilization, Economic Stabilization Agency

[Ceiling Price Regulation 75, Correction]

CPR 75—Ceiling Prices for Certain Processed Soups

CORRECTION

Due to clerical error, the states of Delaware and Virginia were listed with the area "Pennsylvania, other than southeastern etc." in listing the raw material maximum permitted increase for sweet corn in Table II of section 2 (d) (2) instead of in the area of "Counties in Maryland east of Chesapeake Bay and Susquehanna River". Table II is accordingly corrected by deleting the states of Delaware and Virginia from the area "Pennsylvania, other than southeastern etc." in the listing of the raw material maximum permitted increase for sweet corn and placing such states in the area "Counties in Maryland east of Chesapeake Bay and Susquehanna River".

[Ceiling Price Regulation 81]

CPR 81—Ceiling Prices for Frozen Vegetables of the 1951 Pack

Pursuant to the Defense Production Act of 1950, as amended, Executive Order 10161 (15 F. R. 6105), and Economic Stabilization Agency General Order No. 2 (16 F. R. 738), this Ceiling Price Regulation 81 is hereby issued.

STATEMENT OF CONSIDERATIONS

This is the first tailored ceiling price regulation for the frozen vegetable industry. A regulation covering frozen fruits and berries is being issued simultaneously.

To date sales by the frozen vegetable industry were made under the general price freeze provisions of the General Ceiling Price Regulation (16 F. R. 808). By reason of the provisions of Supplementary Regulation 51 to GCPR (16 F. R. 8346) some sellers have been permitted to charge prices in excess of GCPR prices. That regulation, however, provided that sellers taking advantage of its provisions must refund to their buyers the difference between their selling prices and any lower ceiling prices calculated under the first applicable tailored regulation. Consequently, such refunds will be required under this regulation, the first ceiling price regulation applicable to frozen vegetables.

Frozen vegetables are exempted, as seasonal items, from coverage of the Manufacturers' Ceiling Price Regulation, Ceiling Price Regulation 22 (16 F. R. 3562). The technique of the GCPR is not well adapted to the frozen food industry. Most vegetables are frozen within a limited period at the peak of the harvesting season. While some large processors sell their pack throughout the entire year, many smaller processors sell their entire pack in a short period of time after packing. Consequently, some sellers made no sales during the GCPR base period of December 19, 1950–January 25, 1951, and have difficulty determining ceiling prices under GCPR.

Pricing methods. This regulation provides methods for calculating ceiling prices for all frozen vegetables (including rhubarb) of the 1951 pack. The pricing methods are designed to maintain a generally fair and equitable margin for processing frozen vegetables in relation to the margin existing in the base period. The frozen food industry is relatively new in the food field. Accordingly, selling practices are quite varied and different marketing devices are used to meet problems resulting from comparatively small, but expanding total production facilites Nearly all freezers purchase items from other freezers to "fill out their line" of items. A freezer may buy from another an amount of an item which he also processes, or he may buy an amount of an item which he does not process. However, the freezer will sell all of these items to wholesalers or chain store buying agencies at a competitive f. o. b. factory price. In addition, some persons do little or no processing but purchase substantially all of their items from other freezers for sale to wholesalers and chain store buying agencies. Accordingly, with respect to those items which the person does not process himself, he is engaging in a distribution function at a point in the chain of distribution prior to the customarily accepted wholesale and retail levels. In this regulation a person performing such a function is described as a "base distributor". The same person may be at the same time both a processor and a base distributor with respect to different items. However, if a person freezes an item, he is regarded in this regulation as a "processor" for all sales of that item even though he may acquire a portion of the item from other sources. This treatment affords him the same margin over costs which is customarily determined by his pricing policy as a processor.

This distinction, as to a particular person, between his source of supply of an item from his own production and his source of supply of an item from the production of others results in the need for three ceiling prices. A processor calculates two ceiling prices for each item: one for sales to another processor or to a base distributor and a second for sales to wholesalers. A base distributor calculates but one ceiling price: for sales to wholesalers.

To calculate a ceiling price for an item, a processor first determines his weighted average f. o. b. factory sales price, or "base price", for the item sold during the "base period". He obtains two "base prices": one for sales to other processors or base distributors and one for sales to wholesalers. In every case, this "base period" for the item is the 60-day period beginning with and including the first sale of the item at a firm price from the 1948 pack.

He then adjusts each base price by a factor (listed in Table I of section 2) which includes certain labor and material cost increases which have occurred since 1948. These factors are on an area basis. For the major frozen vegetables, however, this factor is expressed as 1.00. To this result, the processor applies the difference between his 1948 and 1951 raw material cost. To do this, the processor determines the difference between his 1948 and 1950 weighted average raw material costs and combines this difference with the difference between his 1950 and 1951 weighted average raw material costs. No raw material permitted cost increase may exceed an amount based upon the 1951 legal minimum price for that raw material as specified in Table II of section 2 (c). The processor's ceiling price f. o. b. factory is his base price adjusted for raw material differences.

A similar method is provided for a "base distributor." The base distributor first determines his weighted average sales price for an item, f. o. b. the factory of origin. He then determines the difference between his 1948 and 1951 acquisition costs of the item and combines this difference with his base price. It is necessary for the base distributor to use his acquisition costs because he does not incur raw material costs.

Adjustment of ceiling prices for storage costs is provided for in accordance with the customary practices of individual processors and by allowing the addition of either monthly or yearly average storage costs.

The year 1948 was selected as a base year for frozen fruits and vegetables, as well as for canned fruits and vegetables, because for most of these products, 1948 was believed to be the most recent representative year during which prices for the most part reflected normal processing margins. The regulations covering these products, therefore, established a general method which provided for the adjustment of the 1948 price for changes in raw material costs and other direct costs. This technique, however, cannot be applied in a mechanical manner. For some products, 1948 was not a normal year and the price did not reflect a normal processing margin. Moreover, changes in methods of production and the resulting impact upon direct costs requires consideration. In the case of some products, the mechanical application of the basic formula might produce a ceiling price that would reflect an unusually small processing margin because for this product the price in 1948 was abnormally low. It may become desirable, therefore, in such cases, to use an adjustment factor which will increase the processing margin and thus increase the ceiling prices themselves.

For most frozen vegetables the use of this formula, without modification, results in ceiling prices at levels providing processing margins considerably in excess of those realized since World War II. The adjustment factor for cost increases other than raw material is based upon cost increases, from 1948 to 1951, for packaging materials and wage rates. This procedure, however, makes no allowance for reduction in costs on a per unit basis. Information available

indicates that there have been significant improvements in the methods of processing frozen vegetables which result in substantial economies. For these reasons the adjustment factor is specified as 1.00 herein for the major frozen vegetables. The same problem was considered in the case of minor frozen vegetables and all frozen fruits and berries. While similar conditions prevail, currently available information indicates that for these products the increases in direct processing costs recognized in the adjustment factor have not been offset by these operating economies.

If information later becomes available to indicate that some direct processing cost increase is justified for the major frozen vegetables, even when consideration is given to the factors listed above, a cost-increase factor will be provided by amendment.

The adjustment factors for cost increases other than raw material provided for rhubarb include an allowance for the increase in sugar cost occurring since 1948. The other minor frozen vegetables are covered by over-all adjustment factors. These were based upon increases in costs of packaging materials and in wage rates occurring since 1948. Separate factors are specified for items in small and large containers since somewhat different cost increases are encountered.

Cost increases for raw material. As in CPR 42 and 55, raw material cost increases are recognized on the basis of cost up to but not in excess of the legal minima prices for the vegetables, as determined by the Secretary of Agriculture. This determination has been made for most vegetables to be covered by the regulation. As to those vegetables for which no parity determination has been made, the Director of Price Stabilization has taken into consideration the recommendations of the Secretary of Agriculture concerning allowable increases necessary to attain the essential production.

The determination by the Secretary is made in the form of individual processors increased raw material costs, either in dollars and cents or percentages between 1950 and 1951. Since, however, the base price is the 1948 sales price during the base period, it is necessary first to relate the 1948 raw material costs to the 1950 costs and then to determine whether in fact there is a raw material increase. Since it is known that some 1948 raw material costs are greater than 1951 costs, it is possible that an individual processor will experience a raw material cost decrease in 1951 as compared to 1948 and 1950 costs. In that case, the processor must subtract the amount of the decrease in figuring his ceiling price.

Special pricing problems. The problem treated in CPR 42, 55 and 56 of determining raw material cost increases for grower-owned cooperatives, grower-processors, and processors not buying raw material at firm prices is also encountered in this regulation. The problem again arises because of the lack of a firm basis on which these types of processors may compute any change in their 1951 raw material costs.

This regulation attempts to treat these three kinds of processors equitably. If they have no firm basis for computing their raw material cost adjustment, they are required to borrow certain raw material costs of their nearest processor of the same raw material.

Conclusion. It is believed that the ceiling prices for frozen vegetables will exceed generally the prices now prevailing or the prices prevailing during January 25, 1951–February 24, 1951.

In formulating this regulation, the Director of Price Stabilization has consulted with the Industry Advisory Committee and has given full consideration to its recommendations. The Director finds that insofar as this regulation may operate to compel any changes in business practices, cost practices, or methods, such changes are necessary to prevent circumvention or evasion of the ceiling prices for vegetables covered by this regulation. In his judgment the provisions of this regulation are generally fair and equitable and are necessary to effectuate the purposes of the Defense Production Act of 1950, as amended.

Insofar as is practicable the Director has given due consideration to the national effort to effect maximum production in furtherance of the Defense Production Act, as amended, to prices prevailing during the periods described in section 402 (d) of the Act, and to relevant factors of general applicability.

REGULATORY PROVISIONS

Sec.

1. Coverage of this regulation.
2. Ceiling prices for processors.
3. Ceiling prices for base distributors.
4. Ceiling prices for processors who purchase raw material on open-end contracts, grower-processors, and grower-owned cooperatives.
5. Ceiling prices for products in new retail carton sizes.
6. Ceiling prices for sellers who are unable to calculate their ceiling prices under sections 2, 3, 4 or 5 of this regulation.
7. Individual authorizations of ceiling prices.
8. Sales f. o. b. shipping points other than factory of origin.
9. Uniform f. o. b. factory prices for factories in different pricing areas.
10. Delivered prices.
11. Uniform delivered pricing by zones or areas.
12. Payment of brokers.
13. Ceiling prices for specially packaged items.
14. Fractions of a cent.
15. Maintenance of customary discounts, allowances and price differentials.
16. Export sales.
17. Storage.
18. Records which must be kept.
19. Reports which must be filed.
20. Sales slips and receipts.
21. Transfer of business.
22. Adjustable pricing.
23. Treatment of excise taxes.
24. Compliance with this regulation.
25. Petitions for amendments, protests and interpretations.
26. Definitions.

AUTHORITY: Sections 1 to 26 issued under sec. 704, 64 Stat. 816, as amended; 50 U. S. C. App. Sup. 2154. Interpret or apply Title IV, 64 Stat. 803, as amended; 50 U. S. C. 2101-2110; E. O. 10161, Sept. 9, 1950, 15 F. R. 6105; 3 CFR 1950 Supp.

SECTION 1. *Coverage of this regulation*—(a) *What products and sellers are covered.* This regulation establishes ceiling prices for sales by processors and base distributors of the 1951 pack of all frozen vegetables.

(b) *Pricing provisions to be used.* The main pricing methods for most processors and base distributors (as defined in section 26) are found in sections 2 and 3 of this regulation. These pricing methods establish two separate formulas to apply to the following situations: (1) A processor of an item selling to other processors of the item; (2) a processor of the item selling to a base distributor; (3) a processor of the item selling to a wholesaler; and (4) a base distributor selling to a wholesaler. If you are a processor, you calculate your ceiling prices under section 2. If you are a base distributor, you figure your ceiling prices under section 3. It is possible for you to be a processor as to some items and a base distributor as to others. If, however, you are a grower-processor, a grower-cooperative, or if you purchase raw material on open-end contracts, you calculate your ceiling prices under section 4. Section 5 of this regulation sets forth the method of calculating your ceiling prices for items not sold during the base period. Sections 6 and 7 of this regulation establish methods by which processors and base distributors who cannot calculate their ceiling prices under any of the other provisions of this regulation may calculate ceiling prices.

(c) *Where this regulation applies.* This regulation applies in the 48 states of the United States and the District of Columbia.

(d) *What this regulation supersedes.* For the products and sellers covered, this regulation supersedes the General Ceiling Price Regulation (16 F. R. 808).

SEC. 2. *Ceiling prices for processors.* For each item you shall calculate a separate ceiling price for sales to other processors and base distributors and a separate ceiling price for sales to wholesalers. You do this by first determining your "base price" for each class. Thereafter, for each class, you adjust your base price by an adjustment for cost increases other than raw material and then by an adjustment for raw material cost changes.

(a) *How processors determine their base price.* Your "base price" is your weighted average sales price per unit of sale, including no more than one month's storage charges, for sales made during the "base period", as defined in section 26, for each of the two classes of sales. Your "weighted average sales price" for each class is the total gross sales dollars charged f. o. b. factory for the item to that class, including no more than one month's storage charges, during the base period divided by the number of units of sale represented thereby.

(1) *What sales and sales contracts you include in your weighted average sales price.* You include in your weighted

average sales price all actual sales at firm prices, including no more than one month's storage charges, of the item made during the base period in the regular course of business, regardless of the date of delivery or date of pack. You exclude the following sales and sales contracts, even though made during the base period; sales at retail (including sales to growers and employees) and at wholesale; sales to chain store buying agencies, or to retail store buying agencies which warehouse the product; sales to government procurement agencies; sales to institutions and domestic users, state agencies and political sub-divisions thereof; sales of damaged goods, and goods packed for experimental purposes.

(3) *Base price for factory group.* In determining your base price, you may determine one base price for each class of sale for any group of factories, all of which are located in the same pricing area. You shall use only one "base period" for each factory group. You shall compute only one raw material adjustment under paragraph (c) of this section for each such factory group.

(b) *How to adjust for permitted increases other than raw material.* After obtaining your base prices for each item, you shall multiply it by the appropriate figure set forth in Table I for the area in which your factory is located. The resulting amount is your "adjusted base price."

TABLE I—PERMITTED INCREASES OTHER THAN RAW MATERIAL

Product	Area		Adjustment factors	
	No.	States included	Retail and institutional sizes	Other sizes
Frozen asparagus, lima beans, snap beans, broccoli, corn, peas, spinach and all mixtures of vegetables.	I	All States	1.00	1.00
Frozen rhubarb	I	do	1.06	1.03
Other frozen vegetables	I	do	1.015	1.025

NOTE: Retail and institutional sizes mean all sizes of containers up to, but not larger than, 20 pound containers.

(c) *How to figure the raw material adjustment.* Next, you shall determine your raw material adjustment by the following procedure:

(1) Determine the difference between your 1948 and your 1950 weighted average raw material cost per ton (or other unit of purchase) as defined in section 26 of this regulation. If your 1948 cost is greater than your 1950 cost, your difference is a minus figure. If your 1950 cost is greater than your 1948 cost, your difference is a plus figure.

(2) Determine the difference between your 1950 and, up to the date of the calculation of your ceiling price, your 1951 weighted average raw material cost per ton (or other unit of purchase), delivered, or contracted to be delivered, at firm prices, at your factory. If your 1950 cost is greater than your 1951 cost, your difference is a minus figure. If your 1951 cost is greater than your 1950 cost, your difference is a plus figure. If the amount by which your 1951 cost exceeds your 1950 cost is greater than the appropriate maximum permitted raw material increase for the area in which your factory is located, both in terms of dollars and cents and in terms of a percentage of your 1950 weighted average raw material cost, as provided in Table II, then in the following computation use either of the increases provided in Table II instead of your actual increase.

(i) If both figures determined under subparagraphs (1) and (2) of this paragraph are plus figures, the total of the two is your upward average raw material adjustment.

(ii) If both figures determined under subparagraphs (1) and (2) of this paragraph are minus figures, the total of the two is your downward raw material adjustment.

(iii) If one figure determined under subparagraphs (1) and (2) of this paragraph is a plus figure and the other a minus figure, reduce the larger of the two figures by the smaller. If the remainder is a plus amount, it is your upward average raw material adjustment; if a minus amount, it is your downward raw material adjustment.

TABLE II—MAXIMUM PERMITTED INCREASE IN RAW MATERIAL COST FROM 1950 TO 1951

Raw material	Area	Maximum permitted increase in dollars per ton	Maximum permitted increase in percentage of 1950 weighted average raw material cost
Asparagus	All States	(1)	(1)
Fresh green peas (shelled basis).	New England States, New York, New Jersey, Pennsylvania, other than Southeastern (Franklin, Cumberland, Adams, York, Dauphin, Lebanon, Lancaster, Berks, Chester, and Delaware Counties).	16.10	18
	Southeastern Pennsylvania, counties in Maryland west of Chesapeake Bay and Susquehanna River, and West Virginia.	20.70	25
	Delaware, counties in Maryland east of Chesapeake Bay and the Susquehanna River, and Virginia.	19.10	25
	Ohio, Indiana, Michigan	19.60	26
	Wisconsin	19.10	23
	Iowa	14.40	16
	Minnesota	22.40	26
	Illinois	21.00	23
	Colorado	20.90	30
	California	16.90	22
	Utah, Southeastern Idaho (Lemhi, Butte, Blaine, Cassia Counties, and all counties east thereof).	25.40	35
	Idaho, other than southeastern, eastern Washington (all counties east of but not including Okanogan, Chelan, Kittitas, Yakima and Klickitat Counties), eastern Oregon (Wasco, Jefferson, Deschutes, and Lake Counties and all counties east thereof).	24.60	33
	Western Washington, western Oregon	25.00	29
	All other States	18.30	22
Snap beans	New England States	31.50	40
	New York	15.00	13
	New Jersey, Pennsylvania, counties in Maryland west of Chesapeake Bay and Susquehanna River.	20.70	21
	Counties in Maryland east of Chesapeake Bay and Susquehanna River, Delaware, Virginia, except Southwestern (Craig, Roanoke, Franklin and Henry Counties and all counties west thereof), eastern North Carolina (Rockingham, Guilford, Randolph, Montgomery and Richmond counties and all counties west thereof).	16.00	18
	Florida	29.00	29
	South Carolina, Georgia, other than North (Fannin, Union, Towns, Rabun, Lumpkin, White and Habersham Counties), Alabama, Mississippi, and Louisiana.	27.40	34
	Arkansas, Oklahoma, Missouri, Tennessee, other than Eastern (Marion, Grundy, Warren, DeKalb, Putnam, Overton, and Clay Counties, and all counties east thereof).	13.40	15
	Eastern Tennessee, western North Carolina, Southwestern Virginia, North Georgia.	30.00	28
	Texas	13.00	16
	Wisconsin, Michigan, Ohio, Indiana, Illinois, Iowa, Minnesota	16.00	14
	Colorado, Utah, New Mexico, Idaho	26.70	31
	Washington, Oregon	29.00	27
	California	23.00	23
	All other States	14.00	14
Fresh lima beans (shelled basis).	New York, New Jersey	29.00	20
	Pennsylvania	27.00	21
	Delaware, Maryland, Virginia	20.00	15
	Arkansas, Missouri, Oklahoma, Tennessee	19.00	14
	Wisconsin, Minnesota, Illois	23.00	18
	Michigan, Indiana	15.00	12
	Ohio, Iowa	13.00	13
	Washington, Oregon, Idaho	27.00	18
	California	22.00	16
	All other States	22.00	16
Sweet corn (unhusked basis).	Maine, New Hampshire	10.40	54
	Vermont	7.20	38
	New York	4.30	21
	Pennsylvania, other than Southeastern (Franklin, Cumberland, Adams, York, Dauphin, Lebanon, Berks, Chester and Delaware Counties).	6.40	29
	Southeastern Pennsylvania, counties in Maryland, west of Chesapeake Bay and Susquehanna River.	6.40	36
	Counties in Maryland east of Chesapeake Bay and Susquehanna River, Delaware, Virginia.	6.40	41

(1) No increase.

TABLE II—MAXIMUM PERMITTED INCREASE IN RAW MATERIAL COST FROM 1950 TO 1951—Continued

Raw material	Area	Maximum permitted increase in dollars per ton	Maximum permitted increase in percentage of 1950 weighted average raw material cost
Sweet corn (unhusked basis)—Continued	Indiana, Illinois, Iowa	5.90	34
	Michigan, Wisconsin, Minnesota, Ohio	6.00	38
	Nebraska	5.90	42
	Washington, Idaho, Utah	5.90	32
	Oregon	6.00	20
	All other States	4.80	21
All other vegetables	All States		20

(3) You then divide your average raw material cost adjustment per ton (or other unit of purchase) by the simple average of your yields per ton (or other unit of purchase) of the raw material for the years 1948, 1949 and 1950 (or such of them in which you packed the product), reduced to your usual units of sale, and adjust for grade yield distribution according to your customary practice during such period. The result of the computations in this paragraph is your upward or downward adjustment for raw material costs per unit of sale of the item.

(d) *Your ceiling price.* If the final result of your computations for raw material cost adjustment provided in paragraph (c) of this section is an increase, you shall add such increase per unit of sale to your adjusted base price as determined in paragraph (b) of this section f. o. b. factory of origin. The result is your ceiling price per unit of sale for the item. If the final result of your computations provided in paragraph (c) of this section is a decrease, you shall subtract such decrease per unit of sale from your adjusted base price as determined in accordance with paragraph (b) of this section. The result is your ceiling price per unit of sale for the item f. o. b. factory of origin.

If you process an item for which you have established a ceiling price under this section and if you also acquire the same item from other sources, your ceiling price for the item determined under this section applies to all of your sales of the item.

(e) *Recalculation.* If, during the pack, your purchase price for the same grade or grades of raw material, changes from that which you were paying when you calculated your prevailing ceiling price for an item, you shall recompute your raw material cost adjustment for the item when your pack has reached an amount equal to 20 percent of your 1950 pack of the same item, and you shall again recompute your raw material adjustment immediately after you have completed your pack of the item. If either of these recomputations shows a decrease in raw material cost, you shall in each case immediately recalculate your ceiling price for the item. If either of these recomputations show an increase in raw material cost, you may, but you are not required to, recalculate your ceiling price for the item. In recalculating the ceiling price of an item under this subsection, you shall figure your weighted average cost of all of the raw material used in processing the item up to the time of your recomputation.

In any case of recalculation of your ceiling prices, no item may be delivered after the recalculation at a price higher than the recalculated ceiling price.

(f) *Items which are mixtures of more than one vegetable.* If you process an item which is a mixture of two or more vegetables, you calculate your ceiling price for such items as follows:

(1) Multiply your base price for the item determined under paragraph (a) of this section by the appropriate figure named in Table I in paragraph (b) of this section. The result is your adjusted base price for the mixture.

(2) Determine the raw material adjustment per ton (or other unit of purchase) in accordance with paragraph (c) of this section for each kind of vegetable in the mixture.

(3) Convert the raw material cost adjustment for each kind of vegetable in the mixture to a per unit basis in accordance with paragraph (c) (3) of this section, using as your yield the yield for each kind of vegetable as though it were processed separately.

(4) Multiply the result obtained for each kind of vegetable under subparagraph (3) of this paragraph by the percentage by weight of that kind of vegetable in the mixture and combine the amounts obtained by this multiplication. The result, which may be a plus or minus figure, is your raw material cost adjustment for the mixture.

(5) If the result of subparagraph (4) is a plus figure, you add that figure to your adjusted base price. If the result of subparagraph (4) of this paragraph is a minus figure, you subtract that figure from your adjusted base price. The result is your ceiling price f. o. b. factory of origin for the mixture.

SEC. 3. *Ceiling prices for base distributors.* You calculate your ceiling price for each item covered by this regulation by first determining your "base price" for the item. ("Base price" is defined in paragraph (a) of this section.) Thereafter, you adjust your "base price" by combining your "base price" with the difference between your 1948 and your 1951 "weighted average acquisition costs" of the item. ("Weighted average acquisition cost" for each of these years is defined in paragraph (b) of this section.)

(a) *How base distributors determine their base price.* Your "base price" during the "base period", as this term is defined in section 26, is your "weighted average sales price" per unit of sale for the item sold during the base period to wholesalers.

Your "weighted average sales price" is the total gross sales dollars charged f. o. b. factory of origin, including no more than one month's storage charges, for the item during the base period divided by the number of units of sale represented thereby. You shall include in your weighted average sales price only the sales and sales contracts defined in section 2 (a) (1).

(b) *How base distributors determine their acquisition cost adjustment.* Next you determine the difference between your 1948 and 1951 "weighted average acquisition cost" for the item for each of these years. This cost is the total gross dollars paid by you for purchase of the item f. o. b. the factory of origin, including not more than one month's storage charges, divided by the total number of units of sale represented thereby. If your 1948 cost is greater than your 1951 cost, your difference is a minus figure. If your 1951 cost is greater than your 1948 cost, your difference is a plus figure.

Your 1948 weighted average acquisition cost is computed for the period from your first purchase of the item from the 1948 pack to the beginning of the 1949 pack of the item. Your 1951 weighted average acquisition cost is computed from the date of your first purchase of the item from the 1951 pack of the item to the beginning of the 1952 pack of the item, or to the date of calculating your ceiling price, whichever is earlier.

If you do not have a 1948 acquisition cost you may not price under this section.

(c) *Your ceiling price.* If the difference under paragraph (b) of this section is a minus figure, you subtract that figure from your base price for the item. If that difference is a plus figure, you add that figure to your base price for the item.

The result is your ceiling price for the item f.o.b. the factory of origin.

(d) *Recalculation.* If, during the 1951 pack of the item, your acquisition costs change from that which you were paying when you calculated your ceiling price for the item, you shall recompute your acquisition cost adjustment for the item when your purchases of the item have reached an amount equal to 20 percent of your 1950 purchases of the same item, and you shall again recompute your acquisition cost adjustment immediately after the completion of the 1951 pack of the item. If either of these recomputations shows a decrease in your acquisition cost, you shall in each case immediately recalculate your ceiling price for the item. If either of these recomputations shows an increase in your acquisition cost, you may recalculate your ceiling price for the item. In recalculating the ceiling price of an item under this paragraph, you shall compute the weighted average acquisition cost of all purchases of the item up to the time of your recomputation.

No item may be delivered after any recalculation of your ceiling price at a price higher than the recalculated ceiling price.

SEC. 4. *Ceiling prices for processors who purchase raw materials on open-end contracts, grower-processors, and grower-owned cooperatives*—(a) Raw *material adjustment.* (1) If you are a processor who purchases raw material on open-end contracts, you shall use your actual weighted average raw material costs for 1948, 1950, and 1951, and make your determination of your raw material cost adjustment in accordance with section 2 of this regulation. If you can determine your actual weighted average raw material costs for 1948 and 1950, but cannot determine your 1951 costs because of facts not ascertainable at the time of calculating your ceiling prices, you shall borrow the 1951 weighted average raw material costs per ton (or other unit of purchase) of your nearest processor of the same kind of raw material in the same raw material area as set forth in Table II who has determined his weighted average raw material costs for these three years in accordance with section 2. You shall then use your actual 1948 and 1950 costs and your borrowed 1951 costs and make your determination of your raw material cost adjustment in accordance with section 2.

(2) If you are a grower-processor or a grower-owned cooperative, and if in 1948, 1950, and 1951 you purchased at least 10 percent, by weight, of your total use of raw material of the product at prices definitely ascertainable at the time of making this computation, you shall use the weighted average purchases for each of these years as your weighted average raw material cost for each of these years and make your determination of your raw material adjustment in accordance with section 2. If, in any of these years, you did not have such purchases, but did not make sales to other processors of the same kind of raw material in a total amount equal to or exceeding 10 percent, by weight, of the amount processed by you in such year, you may substitute the weighted average of such sales for such year.

(3) If you are a grower-processor or a grower-owned cooperative, and you cannot compute your raw material adjustment under subparagraph (2) of this paragraph, you shall borrow the raw material adjustment per ton (or other unit of purchase) of your nearest processor of the same kind of raw material in the same raw material area as set forth in Table II.

(b) *Your ceiling price.* In every case, after having obtained your raw material adjustment in accordance with the above paragraphs, you shall calculate your ceiling prices under the provisions of section 2.

(c) *Reports.* If you calculate your ceiling prices under the provisions of this section, you are required to comply with the reporting requirements of section 19 of this regulation.

(d) *Revision of ceiling prices.* Ceiling prices established under this section are subject to revision by the Director of Price Stabilization in accordance with section 7 (e) of this regulation.

SEC. 5. *Ceiling prices for products in new retail carton sizes.* If you sold the same product during the base period in an item or items which differed from the item being priced only in size of retail carton, and if the size of such carton used during the base period was not more than 50 percent larger or smaller than the item now being priced, you calculate your ceiling price for the new item, as follows:

(a) Determine your raw material cost per unit of sale of the item sold during the base period (whether or not currently packed).

(b) Divide this raw material cost by the label weight of the item sold during the base period.

(c) Multiply this result by the label weight of the item you are pricing.

(d) Subtract the raw material cost from the base price per unit of sale of the item sold during the base period.

(e) Add the result in paragraph (d) to that secured in paragraph (c) of this section. This result is your base price for the new item. You shall then calculate your ceiling price for the item in accordance with section 2 of this regulation.

If you cannot price an item, not sold in the base period under this section, you shall use the provisions of section 6 of this regulation.

SEC. 6. *Ceiling prices for sellers who are unable to calculate their ceiling prices under sections 2, 3, 4 or 5 of this regulation*—(a) *Processors.* If you are a processor and are unable to calculate your ceiling price for an item under sections 2, 4 or 5, you shall use as your ceiling price for that item the simple average of the ceiling prices for the same item, and for the same class of sale, of the three processors of the item who are most competitive with you and who are located in the same pricing area as you are. If there are only two such processors in the area, use the simple average of the two available ceiling prices. If there is only one such processor in the area, you may use his ceiling price.

(b) *Base distributors.* If you are a base distributor and are unable to calculate your ceiling price for an item under section 3, you shall use as your ceiling price for that item the simple average of the ceiling prices for the same item, of the three sellers (either processors or base distributors) who are most competitive with you and who are located in the same pricing area as you are. If there are only two such sellers in the area, use the simple average of the two available ceiling prices. If there is only one such processor in the area, you may use his ceiling price.

(c) *Revision of ceiling prices by the Director of Price Stabilization.* Ceiling prices established under this section are subject to revision by the Director of Price Stabilization in accordance with section 7(e) of this regulation.

(d) *Application for ceiling prices.* If you are unable to obtain the ceiling prices of the required processors located near you, apply to the Fruit and Vegetable Branch, Office of Price Stabilization, Washington 25, D. C., for an individual authorization of a ceiling price in accordance with section 7 of this regulation.

(e) *Reports.* If you calculate your ceiling prices under the provisions of this section, you are required to comply with the reporting requirements of section 19.

SEC. 7. *Individual authorization of ceiling prices.* If you cannot determine your ceiling price for an item under any of the foregoing pricing methods of this regulation you shall, before delivering the item to any purchaser, apply to the Fruit and Vegetable Branch, Office of Price Stabilization, Washington 25, D. C., for a ceiling price for each item. This application shall be made on O. P. S. Public Form No. Pub. 73 available at any Office of Price Stabilization office.

(a) *Information that must be given in all cases.* In all such cases, you shall submit, if available, the following information in your application.

(1) A description in detail of the item for which a ceiling price is sought; a statement of the facts that make it different from the most similar item for which you have determined a ceiling price, identifying the similar item and stating its ceiling price; and a statement giving the reasons why a ceiling price cannot be established under the pricing methods of this regulation. This statement shall indicate whether sales of the item have previously been made, and if so, whether you established a ceiling price under the General Ceiling Price Regulation, and if so, the ceiling price you so established for each class of purchaser and the number of the section of the General Ceiling Price Regulation under which you established such ceiling price.

(2) The 1948, 1950 and 1951 weighted average raw material costs per ton (or other unit of purchase) figured in the manner and subject to the limitations set forth in section 2 of this regulation, and a statement showing your current yield in units of sale.

(3) An itemized breakdown of your estimated total costs for 1951 computed in accordance with your customary accounting practice.

(4) The ceiling price you propose for the item, indicating whether it is for sale to wholesalers, or other classes of purchasers, and any discounts, or allowances that should be applicable to the proposed ceiling price and a list of your customary discounts, transportation and other allowances and price differentials.

(5) The volume of the item which you have on hand and which you expect to produce during the remainder of the pack year.

If you are unable to submit any of the required information, state why you are unable to do so.

(b) *Supplementary information must be given if specifically requested.* You shall mail to the Fruit and Vegetable Branch, Office of Price Stabilization, Washington 25, D. C., within 15 days after receipt of a request such additional information as shall be requested. If you fail, without reasonable explanation, to submit all additional information that may have been requested within 15 days after the request is mailed, your application shall be considered withdrawn and the docket closed. Unless the application is refiled, the docket will not be reopened upon later receipt of this information, and further consideration by the

Office of Price Stabilization will not be given.

(c) *Disposition of application.* Upon receipt of your application, the Office of Price Stabilization will authorize a ceiling price, or a method of determining the ceiling price, for you or for sellers of the item generally. The ceiling price authorized shall be one that bears a proper relationship to those for comparable items and sellers.

Your proposed price shall be considered authorized 20 days after the application, or all additional information that may have been requested (whichever date is the later), is mailed by registered air mail, addressed to the Fruit and Vegetable Branch, Office of Price Stabilization, Washington 25, D. C., unless within that time, you have received from the Office of Price Stabilization a notice to the contrary.

(d) *Delivery before authorization of ceiling prices.* After filing the application, you may deliver the item and receive a payment of not more than 75 percent of the proposed price, but you may not receive further payment for it until a ceiling price is authorized.

(e) *Revision of prices by the Office of Price Stabilization.* Any ceiling price established under this section shall be subject to revision at any time by the Office of Price Stabilization.

SEC. 8. *Sales f. o. b. shipping points other than factory of origin.* If, during the base period, you sold, either as a processor or a base distributor, all or portions of an item at a shipping point other than the factory where the item was processed and if you did not, during the base period absorb the transportation costs from the factory to this shipping point, you shall, in calculating your ceiling price f. o. b. factory of origin, subtract from the base period sales price the transportation costs for the item from the factory of origin to such shipping point. Then add to your f. o. b. factory ceiling price, for all or any portion of the item sold f. o. b. such shipping point, the current transportation costs from the factory of origin to such shipping point.

SEC. 9. *Uniform f. o. b. factory prices for factories in different pricing areas.* (a) If you process the item being priced at more than one factory and if your ceiling prices for the item vary by factories located in different pricing areas, you may establish a uniform ceiling price for the item for any group of factories by figuring a weighted average of their separate ceiling prices.

(b) For any two or more factories selected by you, your "weighted average ceiling price" shall be figured by you as follows:

(i) Determine the total gross sales dollars which would have been obtained if your total production of the item at those factories during 1950 had been sold at the separate ceiling prices otherwise determined under this regulation and,

(ii) Divide that figure by the total number of units of sale of the item included in that 1950 total production. The result is your uniform f. o. b. factory price.

(c) If you at any time recalculate your ceiling prices for an item under the provisions of section 2 of this regulation, you shall at that time recalculate your weighted average ceiling price under this section.

SEC. 10. *Delivered prices.* You may figure a delivered ceiling price by adding to the ceiling price for the item f. o. b. factory of origin, the amount of the current transportation charges per unit of sale of that item.

SEC. 11. *Uniform delivered pricing by zones or areas*—(a) *Sellers who sold during 1950 on a uniform delivered price by zones or areas*—(1) *For one factory.* If you sold or delivered an item covered by this regulation during 1950 on an established uniform delivered price basis by zones or areas, you may establish a delivered ceiling price for the same zones or areas by adding to your ceiling price f. o. b. factory of origin an average transportation charge, figured on the same basis as you figured such charge during 1950, but at current transportation rates. If you desire to sell an additional item not sold during 1950 on such uniform delivered price basis, you may establish a uniform delivered ceiling price for the same zones or areas, by adding to your f. o. b. factory of origin ceiling price for the item, transportation charges which are mathematically proportional by shipping weight to the charges which were added to an item of the nearest shipping weight sold on a uniform delivered price basis in 1950.

(2) *For two or more factories.* If you sold an item during 1950 from two or more factories on an established uniform delivered price basis, by zones or areas, regardless of the factories from which the shipment was made, you may continue such practice for the same zones or areas. Your uniform delivered ceiling price for the item shall be the weighted average of the delivered ceiling prices, as figured in subparagraph (1) of this paragraph, for the item computed on the basis of the proportion of production of the item in each of your respective factories in 1950.

SEC. 12. *Payment of brokers.* In each case, the amount paid by the buyer to the processor or base distributor plus any amount paid by the buyer for brokerage service to the broker shall not exceed the total of the processor's or base distributor's ceiling price and allowable transportation costs actually paid by the processor, base distributor or by the broker. The term "broker" includes a "finder."

SEC. 13. *Ceiling prices for specially packaged items*—(a) *Amount of adjustment.* If your buyer specifies, in writing, special packaging for government use other than standard packaging, you shall adjust your ceiling price per unit of sale of the item as otherwise determined under this regulation if the special packaging required is lower in cost than standard packaging. "Packaging" and "standard packaging" are defined in paragraph (d) of this section. If the cost of standard packaging per unit of sale to you is greater than the cost of the required special packaging per unit of sale, you shall subtract such difference in cost from your ceiling price per unit of sale otherwise determined under this regulation. This result is your f. o. b. factory of origin ceiling price per unit of sale of the specially packaged item. If the cost of the required special packaging, per unit of sale, is greater than the cost of standard packaging per unit of sale, you may, but are not required to, add such difference in cost to your ceiling price per unit of sale otherwise determined under this regulation. The result is your f. o. b. factory of origin ceiling price per unit of sale of the specially packaged item.

(b) *Invoice and record-keeping requirements.* In any case where your ceiling price is adjusted under this section, you shall:

(1) Show separately the amount of the adjustment in your contract of sale or on your invoice.

(2) In addition to the records otherwise specified by this regulation prepare and keep for inspection by the Office of Price Stabilization, for two years from the date of your invoice to the buyer, accurate records showing the cost of standard packaging and the cost of packaging according to the specifications of the buyer.

(c) *Computation of costs.* You shall compute your costs according to your established accounting methods. You must make allowances for any materials salvaged in unpacking and repacking.

(d) *Meaning of "packaging" and "standard packaging".* "Packaging" means the providing of wrappings, inner cartons, outer cartons; the placing of commodities in such wrappings or cartons; the application of any special coverings or coatings; and any unpacking and repacking necessary to conform to the specifications of the buyer.

"Standard packaging" means the most expensive packaging the cost of which was included in figuring the ceiling prices established by this regulation.

SEC. 14. *Fractions of a cent.* When calculating your ceiling prices, you shall carry out all amounts to four decimal places (hundredths of a cent). If any calculated ceiling price includes a fraction of a cent, you adjust your ceiling prices to the nearest quarter of a cent with respect to sales of items in institutional sizes and to the nearest half-cent in sales of items in consumer sizes. However, if you had an established method for quoting your sales prices during the base period, you may continue to adjust your ceiling price to the nearest cent or half-cent or quarter-cent in accordance with such established method.

SEC. 15. *Maintenance of customary discounts, allowances and price differentials.* You shall not change any customary allowance, discount or other price differential (as defined in section 26 of this regulation) to a purchaser or class of purchasers, if the change results in a higher price to that purchaser or class. However, this provision does not require you to sell any item unlabeled, or under a buyer's label, or to extend or duplicate any temporary promotional campaign.

SEC. 16. *Export sales.* The ceiling price at which you may export any item

covered by this regulation shall be determined in accordance with Ceiling Price Regulation 61. (16 F. R. 7597.)

SEC. 17. *Storage.* (a) You may not add to the ceiling price of items, storage costs on goods owned by you if customarily absorbed by you. For sales of an item on a storage basis (beyond one month's storage), you may adjust your ceiling price in accordance with your established practice by the amount of your current storage cost or your current storage standards for each item. You may compute such costs either on a monthly basis or an average yearly basis, provided that the average yearly basis shall not exceed a total of the charge for seven months' storage, including the first month's storage charges.

(b) Storage by you of goods owned by the buyer shall be charged for in accordance with the rates provided by the ceiling price regulation applicable to such services.

SEC. 18. *Records which must be kept.* If you make sales covered by this regulation, you shall:

(a) Preserve for examination by the Office of Price Stabilization, for two years from the date of your invoice to the buyer, all records of the same kind as you have customarily kept, relating to the prices which you charged for those sales, and

(b) Preserve for examination by the Office of Price Stabilization for as long as the Defense Production Act of 1950, as amended, remains in effect, and for two years thereafter, all your existing records which were the basis of calculating your ceiling prices in the manner directed by this regulation, showing the method used in calculating the ceiling prices.

SEC. 19. *Reports which must be filed.* (a) If you determine ceiling prices for items covered by this regulation, you shall mail to the Fruit and Vegetable Branch, Office of Price Stabilization, Washington 25, D. C., a report on OPS Public Form No. Pub. 97 available at any office of the Office of Price Stabilization, for all items for which you determine ceiling prices under this regulation. All items of a particular product may be included on one form. However, you shall file a supplemental form if you calculate ceiling prices for some items of the particular product at a later date.

(b) You shall mail to the Fruit and Vegetable Branch, Office of Price Stabilization, Washington 25, D. C., the report required by this section for any item within 5 days after such item is offered for sale.

SEC. 20. *Sales slips and receipts.* If you have customarily given a purchaser a sales slip, invoice or similar evidence of purchase, you shall continue to do so. Upon request, you must, regardless of previous custom, give the purchaser a receipt showing the date, your name and address, the name and quantity of each item sold, and the price received for it.

SEC. 21. *Transfer of business.* If the business, assets or stock in trade of any person covered by this regulation, is sold or otherwise transferred to you on or after the effective date of this regulation, your ceiling prices for items covered by this regulation and processed or dealt in in the course of such business shall be the same as those which your transferor would have been required to use, and your obligation to keep records sufficient to verify such prices is the same. The transferor must either preserve and make available, or turn over, to you all records of transactions prior to the transfer which he has and which are necessary to enable you to comply with the record provisions of this regulation.

SEC. 22. *Adjustable pricing.* You may agree to sell at a price which can be increased up to the ceiling price in effect at the time of delivery, but you may not, unless authorized by the Office of Price Stabilization, deliver or agree to deliver at prices to be adjusted upward in accordance with action taken by the Office of Price Stabilization after delivery. Such authorization may be given when a request for a change in the applicable ceiling price is pending, but only if the authorization is necessary to promote production or distribution and will not interfere with the purposes of the Defense Production Act of 1950, as amended. The authorization may be given by the Director of Price Stabilization or by any official of the Office of Price Stabilization having authority to act upon the pending request for a change in price or to give the authorization. The authorization will be given by order, except that it may be given by letter or telegram when the contemplated action is the authorization of an individual ceiling price.

SEC. 23. *Treatment of excise taxes*—(a) *Taxes in effect during base period.* If, during the base period, you separately stated and collected any excise or similar tax you may continue to collect the current amount of any such tax in addition to your ceiling price. If you did not customarily, during the base period, state and collect separately from the purchase price the amount of tax paid by you, you may not collect the amount of such tax in addition to your ceiling price.

(b) *Taxes imposed since base period.* In all other cases, if at the time you calculate your ceiling price the statute or ordinance imposing the tax does not prohibit you from stating and collecting the tax separately from the purchase price, you may collect in addition to your ceiling price, the amount of the tax actually paid by you.

In every case where the tax is collected from the purchaser, the amount thereof shall be separately stated.

SEC. 24. *Compliance with this regulation*—(a) *No selling or buying above ceiling prices.* Regardless of any contract or obligation, no person shall sell or deliver or, in the course of trade, buy or receive any item at a price higher than the ceiling price established by this regulation.

(b) *Evasion.* No person shall evade a ceiling price, directly or indirectly, whether by commission, service, transportation, or other charge or discount, premium, or other privilege; by tie-in requirement or other trade understanding; by any change of style of pack; by a business practice relating to grading, labeling or packaging, or in any other way.

(c) *Enforcement.* Any person violating a provision of this regulation is subject to the criminal penalties, civil enforcement actions, and suits for treble damages provided by the Defense Production Act of 1950, as amended.

SEC. 25. *Petitions for amendments, protests and interpretations.* Any protest, petition for amendment, or request for interpretation of this regulation, may be filed in accordance with the provisions of Price Procedural Regulation 1, Revised (16 F. R. 9055).

SEC. 26. *Definitions.* When used in this regulation the term:

(a) "Base distributor" means a person other than a processor who purchases the item from a processor and sells the item to wholesalers and chain store buying agencies.

(b) "Base period" for an item means the 60-day period beginning with and including the first day you sold the item of the 1948 pack at a firm price.

(c) "Frozen vegetable" means a raw vegetable which has been processed by a processor by subjecting the vegetable to temperatures below the freezing point so as to extend materially the period of its availability for consumption as a food. This term includes all vegetables which are so processed irrespective of the speed of freezing or the temperatures employed.

(d) "Grade" means the commercial grade or customary trade quality designation at the time of shipment. However, where the processor elects to use grades as established and defined by any governmental agency and sells the item under any such grade designation, the term "grade" means such grade at time of shipment.

(e) "Item" means a kind, variety, grade, size, style of pack, or container type or size, of a product. Brand names shall not in themselves constitute separate items.

(f) "Pack" of any year means the items obtained from the raw product, the major portion of which is processed during that calendar year.

(g) "Person" means an individual, corporation, partnership, association, or any other organized group of persons, and their legal successors or representatives. The term includes the United States, its agencies, other governments, their political subdivisions and their agencies.

(h) "Processor" means a person who is engaged commercially in preserving a vegetable by processing by freezing so as to materially extend the period of its availability for consumption as a food. The term includes a person who has the item processed for him by another and who owns the raw material immediately prior to and throughout the processing.

(i) "Product" means the common and usual name of a finished food processed from a vegetable covered by this regulation.

(j) "Sales at retail" means sales to ultimate consumers other than commercial, industrial and institutional users.

(k) "Sales at wholesale" means sales with respect to which the processor has performed the function of selling as a wholesaler to retail stores, but not including sales to chain store buying agencies, or to associations of retail store buying agencies which warehouse the product prior to distribution to the individual retail outlet.

(l) "Same pricing area" means the same area, both for permitted increases other than raw material and for raw material permitted adjustments as set forth in Tables I and II.

(m) "Units of sale" means your customary invoicing quantities of the item, such as dozen, carton, pound, etc.

(n) "Weighted average raw material cost" means the total amount paid by the processor to the grower for the raw agricultural material plus any transportation, storage, harvesting, seeds and plants, freight, boxes, bags, acquisition, and other direct costs paid or incurred by the processor up to the point of delivery at his factory divided by the total tons (or other units of purchase) of raw material represented thereby.

(o) "You" or "Your" means any processor or other person whose sales are covered by this regulation.

Effective date. The effective date of this regulation is October 25, 1951, or such earlier date between October 11, 1951, and October 25, 1951, as you may select. If you select an earlier date, this regulation becomes effective as to you upon that date for all of your items covered by this regulation.

NOTE: The record-keeping and reporting requirements of this regulation have been approved by the Bureau of the Budget in accordance with the Federal Reports Act of 1942.

MICHAEL V. DISALLE,
Director of Price Stabilization.

OCTOBER 11, 1951.

[F. R. Doc. 51-12360; Filed, Oct. 11, 1951; 4:00 p. m.]

[Ceiling Price Regulation 82]

CPR 82—CEILING PRICES FOR FROZEN FRUITS AND BERRIES OF THE 1951 PACK

Pursuant to the Defense Production Act of 1950, as amended, Executive Order 10161 (15 F. R. 6105), and Economic Stabilization Agency General Order No. 2 (16 F. R. 738), this Ceiling Price Regulation 82 is hereby issued.

STATEMENT OF CONSIDERATIONS

This is the first tailored ceiling price regulation for the frozen fruit and berry industry. A regulation covering frozen vegetables is being issued simultaneously.

To date sales by the frozen fruit and berry industry were made under the general price freeze provisions of the General Ceiling Price Regulation (16 F. R. 808). By reason of the provisions of Supplementary Regulation 51 to GCPR (16 F. R. 8346) some sellers have been permitted to charge prices in excess of GCPR prices. That regulation provided, however, that sellers taking advantage of its provisions must refund to their buyers the difference between their selling prices and any lower ceiling prices calculated under the first applicable tailored regulation. Consequently, such refunds will be required under this regulation, the first regulation applicable to frozen fruits and berries.

Frozen fruits and berries are exempted, as seasonal items, from the coverage of the Manufacturers' Ceiling Price Regulation, Ceiling Price Regulation 22 (16 F. R. 3562). The technique of the GCPR is not well adapted to the frozen food industry. Most fruits and berries are frozen within a limited period at the peak of the harvesting season. While some large processors sell their pack throughout the entire year, many smaller sellers sell out their entire pack in a very short period close to the time of packing. Consequently, some sellers made no sales during the GCPR base period of December 19, 1950–January 25, 1951, and have difficulty determining ceiling prices under the GCPR.

Pricing methods. This regulation provides methods for calculating ceiling prices for all frozen fruits and berries (excluding frozen citrus products and other frozen concentrates and purees) of the 1951 pack. The pricing methods are designed to maintain a generally fair and equitable margin for processing frozen fruits and berries in relation to the margin existing in the base period. The frozen food industry is relatively new in the food field. Accordingly, selling practices are quite varied and different marketing devices are used to meet problems resulting from comparatively small, but expanding total production facilities. Nearly all freezers purchase items from other freezers to "fill out their line" of items. A freezer may buy from another an amount of an item which he also processes, or he may buy an amount of an item which he does not process. However, the freezer will sell all of these items to wholesalers or chain store buying agencies at a competitive f.o.b. factory price. In addition, some persons do little or no processing but purchase substantially all of their items from other freezers for sale to wholesalers and chain store buying agencies. Accordingly, with respect to those items which the person does not process himself, he is engaging in a distribution function at a point in the chain of distribution prior to the customarily accepted wholesale and retail levels. In this regulation a person performing such a function is described as a "base distributor". The same person may be at the same time both a processor and a base distributor with respect to different items. However, if a person freezes an item, he is regarded in this regulation as a "processor" for all sales of that item even though he may acquire a portion of the item from other sources. This treatment affords him the same margin over costs which is customarily determined by his pricing policy as a processor.

This distinction, as to a particular person, between his source of supply of an item from his own production and his source of supply of an item from the production of others results in the need for three ceiling prices. A processor calculates two ceiling prices for each item: one for sales to another processor or to a base distributor and a second for sales to wholesalers. A base distributor calculates but one ceiling price: for sales to wholesalers.

To calculate a ceiling price for an item, a processor first determines his weighted average f. o. b. factory sales price, or "base price", for the item sold during the "base period". He obtains two "base prices": one for sales to other processors or base distributors and one for sales to wholesalers. In every case, this "base period" for the item is the 60-day period beginning with and including the first sale of the item at a firm price from the 1948 pack.

He then adjusts each base price by a factor (listed in Table I of section 2) which includes certain labor and material cost increases which have occurred since 1948. These factors are on an area basis. To this result, the processor applies the difference between his 1948 and 1951 weighted average raw material costs. No raw material permitted cost increase may exceed an amount based upon the 1951 legal minimum price for that raw material as specified in Table II of section 2(c). Finally, the processor adjusts for sugar or syrup cost increases. The processor's ceiling price f. o. b. factory is his base price adjusted for raw material cost and sugar cost differences.

A similar method is provided for a "base distributor". The base distributor first determines his weighted average sales price for an item, f. o. b. the factory or origin. He then determines the difference between his 1948 and 1951 acquisition costs of the item and combines this difference with his base price. It is necessary for the base distributor to use his acquisition costs because he does not incur raw material costs.

Adjustment of ceiling prices for storage costs is provided for in accordance with the customary practices of individual processors and by allowing the addition of either monthly or yearly average storage costs.

The year 1948 was selected as a base year for frozen fruits and vegetables, as well as for canned fruits and vegetables, because for most of these products, 1948 was believed to be the most recent representative year during which prices for the most part reflected normal processing margins. The regulations covering these products, therefore, established a general method which provided for the adjustment of the 1948 price for changes in raw material costs and other direct costs. This technique, however, cannot be applied in a mechanical manner. For some products, 1948 was not a normal year and the price did not reflect a normal processing margin. Moreover, changes in methods of production and the resulting impact upon direct costs require consideration. In the case of some products, the mechanical application of the basic formula might produce a ceiling price that would reflect an unusually small processing margin because for this product the price in 1948 was

abnormally low. It may become desirable, therefore, in such cases, to use an adjustment factor which will increase the processing margin and thus increase the ceiling prices themselves. Adjustment factors for cost increases other than raw material are included herein for all fruits and berries. Separate factors are specified for items in small and large containers since somewhat different cost increases are encountered.

Cost increases for raw material. As in CPR 56, raw material cost increases are recognized on the basis of cost up to but not in excess of the legal minima prices for the fruits and berries, as determined by the Secretary of Agriculture. This determination has been made for most fruits and berries to be covered by the regulation. The remaining raw material cost increases, which are not currently available, will be added as soon as possible by amendment.

The determination by the Secretary is made in the form of individual processor's increased raw material costs, either in dollars and cents or percentages between 1948 and 1951. Since it is known that some 1948 raw material costs are greater than 1951 costs, it is possible that an individual processor will experience a raw material cost decrease in 1951 as compared to 1948 costs. In that case, the processor must subtract the amount of the decrease in figuring his ceiling price.

Special pricing problems. The problem treated in CPR 42, 55 and 56 of determining raw material cost increases for grower-owned cooperatives, grower-processors, and processors not buying raw material at firm prices is also encountered in this regulation. The problem again arises because of the lack of a firm basis on which these types of processors may compute any change in their 1951 raw material costs.

This regulation attempts to treat these three kinds of processors equitably. If they have no firm basis for computing their raw material cost adjustment, they are required to borrow certain raw material costs of their nearest processor of the same raw material.

Conclusion. It is believed that the ceiling prices for frozen fruits and berries will exceed generally the prices now prevailing or the prices prevailing during January 25, 1951–February 24, 1951.

In formulating this regulation, the Director of Price Stabilization has consulted with the Industry Advisory Committee and has given full consideration to its recommendations. The Director finds that insofar as this regulation may operate to compel any changes in business practices, cost practices, or methods, such changes are necessary to prevent circumvention or evasion of the ceiling prices for fruits and berries covered by this regulation. In his judgment the provisions of this regulation are generally fair and equitable and are necessary to effectuate the purposes of the Defense Production Act of 1950, as amended.

Insofar as is practicable the Director has given due consideration to the national effort to effect maximum production in furtherance of the Defense Production Act, as amended, to prices prevailing during the periods described in section 402 (d) of the act, and to relevant factors of general applicability.

REGULATORY PROVISIONS

Sec.

1. Coverage of this regulation.
2. Ceiling prices for processors.
3. Ceiling prices for base distributors.
4. Ceiling prices for processors who purchase raw material on open-end contracts, grower-processors, and grower-owned cooperatives.
5. Ceiling prices for products in new retail carton sizes.
6. Ceiling prices for sellers who are unable to calculate their ceiling prices under sections 2, 3, 4 or 5 of this regulation.
7. Individual authorizations of ceiling prices.
8. Sales f. o. b. shipping points other than factory of origin.
9. Uniform f. o. b. factory prices for factories in different pricing areas.
10. Delivered prices.
11. Uniform delivered pricing by zones or areas.
12. Payment of brokers.
13. Ceiling prices for specially packaged items.
14. Fractions of a cent.
15. Maintenance of customary discounts, allowances and price differentials.
16. Export sales.
17. Storage.
18. Records which must be kept.
19. Reports which must be filed.
20. Sales slips and receipts.
21. Transfer of business.
22. Adjustable pricing.
23. Treatment of excise taxes.
24. Compliance with this regulation.
25. Petitions for amendments, protests and interpretations.
26. Definitions.

AUTHORITY: Sections 1 to 26 issued under sec. 704, 64 Stat. 816, as amended; 50 U. S. C. App. Sup. 2154. Interpret or apply Title IV, 64 Stat. 803, as amended; 50 U. S. C. 2101–2110; E. O. 10161, Sept. 9, 1950, 15 F. R. 6105; 3 CFR 1950 Supp.

SECTION 1. *Coverage of this regulation*—(a) *What products and sellers are covered.* This regulation establishes ceiling prices for sales by processors and base distributors of the 1951 pack of all frozen fruits. This regulation does not apply to sales of frozen citrus products or other frozen fruit concentrates and purees.

(b) *Pricing provisions to be used.* The main pricing methods for most processors and base distributors (as defined in section 26) are found in sections 2 and 3 of this regulation. These pricing methods establish two separate formulas to apply to the following situations: (1) A processor of an item selling to other processors of the item; (2) a processor of the item selling to a base distributor; (3) a processor of the item selling to a wholesaler; and (4) a base distributor selling to a wholesaler. If you are a processor, you calculate your ceiling prices under section 2. If you are a base distributor, you figure your ceiling prices under section 3. It is possible for you to be a processor as to some items and a base distributor as to others. If, however, you are a grower-processor, a grower-cooperative, or if you purchase raw material on open-end contracts, you calculate your ceiling prices under section 4. Section 5 of this regulation sets forth the method of calculating your ceiling prices for items not sold during the base period. Sections 6 and 7 of this regulation establish methods by which processors and base distributors who cannot calculate their ceiling prices under any of the other provisions of this regulation may calculate ceiling prices.

(c) *Where this regulation applies.* This regulation applies in the 48 states of the United States and the District of Columbia.

(d) *What this regulation supersedes.* For the products and sellers covered, this regulation supersedes the General Ceiling Price Regulation. (16 F. R. 808.)

SEC. 2. *Ceiling prices for processors.* For each item you shall calculate a separate ceiling price for sales to other processors and base distributors and a separate ceiling price for sales to wholesalers. You do this by first determining your "base price" for each class. Thereafter, for each class, you adjust your base price by an adjustment for cost increases other than raw material, by an adjustment for sugar cost changes, and then by an adjustment for raw material cost charges.

(a) *How processors determine their base price.* Your "base price" is your weighted average sales price per unit of sale, including no more than one month's storage charges, for sales made during the "base period", as defined in section 26, for each of the two classes of sales. Your "weighted average sales price" for each class is the total gross sales dollars charged f. o. b. factory for the item to that class, including no more than one month's storage charges, during the base period divided by the number of units of sale represented thereby.

(1) *What sales and sales contracts you include in your weighted average sales price.* You include in your weighted average sales price all actual sales at firm prices, including no more than one month's storage charges, of the item made during the base period in the regular course of business, regardless of the date of delivery or date of pack. You exclude the following sales and sales contracts, even though made during the base period; sales at retail (including sales to growers and employees) and at wholesale; sales to chain store buying agencies, or to retail store buying agencies which warehouse the product; sales to government procurement agencies; sales to institutions and domestic users, state agencies and political sub-divisions thereof; sales of damaged goods, and goods packed for experimental purposes.

(2) *Base price for factory group.* In determining your base price, you may determine one base price for each class of sale for any group of factories, all of which are located in the same pricing area. You shall use only one "base period" for each factory group. You shall compute only one raw material adjustment under paragraph (c) of this section for each such factory group.

(b) *How to adjust for permitted increases other than raw material and sugar.* After obtaining your base prices for each item, you shall multiply it by the appropriate figure set forth in Table I for the area in which your factory is located.

TABLE I—PERMITTED INCREASES OTHER THAN RAW MATERIAL AND SUGAR

Product	Area		Adjustment factors	
	No.	States included	Retail and institutional sizes	Other sizes
Frozen R. S. P. cherries	I	All States	1.03	1.02
Frozen apples and sauce	I	California, Oregon, Washington	1.05	1.03
	II	All other States	1.09	1.06
Frozen strawberries	I	California, Oregon, Washington	1.03	1.02
	II	All other States	1.04	1.025
Other frozen fruits and berries, including all mixtures of fruits or berries.	I	All States	1.04	1.025

NOTE: Retail and institutional sizes mean all sizes of containers up to, but not larger than, 20 pound containers.

(c) *How to figure the raw material adjustment.* Next, you shall determine your raw material adjustment, other than for sugar or syrup by the following procedure:

(1) Determine the difference between your 1948 and, up to the date of this computation, your 1951 weighted average raw material cost, as defined in section 26 of this regulation, per ton (or other unit of purchase).

(2) If your 1951 cost is greater than your 1948 cost and if the permitted adjustment listed in Table II is a plus figure, you shall use either your actual increase or the appropriate increase listed in Table II, whichever increase is less. If your 1951 cost is greater than your 1948 cost, and if the permitted adjustment listed in Table II is a minus figure, you shall use the appropriate increase listed in Table II. If your 1948 cost is greater than your 1951 cost and if the permitted adjustment listed in Table II is a plus figure, you shall use your actual decrease. If your 1948 cost is greater than your 1951 cost and if the permitted adjustment listed in Table II is a minus figure, you shall use either your actual decrease or the appropriate decrease listed in Table II, whichever is the larger.

TABLE II—RAW MATERIAL COST ADJUSTMENTS

Raw material	Area	Unit	Permitted adjustment in dollars per unit
Apricots	California	Ton	+49.00
	Utah	do	+78.30
	Washington, Oregon	do	+64.10
	All other States	do	+45.40
Cherries, Sour	Ohio	do	−1.00
	New York, Pennsylvania, Oregon and Washington	do	+25.00
	Michigan, Utah	do	+55.00
	All other States	do	+77.00
Cherries, Sweet	California	do	−1.00
	Idaho	do	+15.00
	New York, Pennsylvania, Ohio	do	+54.00
	Oregon, Washington	do	+89.00
	Michigan	do	+41.00
	All other States	do	+20.00
Cranberries	All States	Barrel	+10.50
Figs	California	Ton	+51.00
	Texas	do	+71.00
Peaches, Clingstone	All States	do	+11.10
Peaches, Freestone	Oregon, Washington	do	+23.65
	California	do	+11.90
	South Carolina	do	−5.30
	Georgia	do	+11.95
	Michigan	do	+42.50
	All other States	do	+16.31
Pears	California	do	−26.50
	Oregon, Washington	do	−7.30
	All other States	do	+2.00
Plums	California	do	−6.80
	All other States	do	+23.20
Prunes, Fresh	Washington, Oregon	do	+28.00
	All other States	do	+24.70
Blackberries	All States (except Washington and Oregon)	Pound	+.062
	Washington and Oregon	do	+.10
Boysenberries	All States	do	+.025
Gooseberries	do	do	+.044
Loganberries	do	do	+.023
Raspberries, Black	do	do	+.005
Raspberries, Red	do	do	+.07
Strawberries	Louisiana	do	+.006
	California	do	+.020
	All other States	do	+.021
Youngberries	All States	do	+.021
Blueberries			
Wild	do	do	+.051
Cultivated	do	do	+.005
Currants	do	do	+.051
Crabapples	do	Ton	+27.00
Quinces	do	do	+35.00

(3) You then divide your average raw material cost adjustment per ton (or other unit of purchase) by the simple average of your yields per ton (or other unit of purchase) of the raw material for the years 1948, 1949 and 1950 (or such of them in which you packed the product), reduced to your usual units of sale, and adjust for grade yield distribution according to your customary practice during such period.

The result of the computations in this paragraph is your upward or downward adjustment for raw material costs per unit of sale of the item.

If the final result of your computations for raw material cost adjustment provided in this paragraph is an increase, you shall add such increase per unit of sale to your adjusted base price as determined in paragraph (b) of this section. If the final result of your computations provided in this paragraph is a decrease, you shall subtract such decrease per unit of sale from your adjusted base price as determined in accordance with paragraph (b) of this section.

(d) *Your sugar or syrup cost adjustment.* (1) You shall compute your sugar or syrup cost adjustment by first determining the difference between the weighted average cost per unit of purchase of your sweetening ingredient in 1948 and in 1951 up to the date of this calculation of your ceiling price. You then convert this difference to a cost per pound, dry basis. Next, you determine the weight of the put-in sweetening ingredient per unit of sale and multiply that weight by the difference in cost of the sweetener per pound. The result is your sugar or syrup cost adjustment.

(2) If you use dextrose, corn syrup, corn syrup solids or liquid sugar in processing an item, you shall first convert all sweetening ingredients, including sucrose, to a sugar solids basis in accordance with Table 23 of the publication: *Conversion Factors and Weights and Measures for Agricultural Commodities and Their Products* (U. S. Department of Agriculture, Production and Marketing Administration, August, 1947) or any equivalent table. Then determine the cost increase or decrease for each sweetening ingredient in accordance with subparagraph (1) of this paragraph, and compute the total cost increase of all sweeteners in the item weighted to reflect the proportions of each sweetening ingredient in the item.

(3) You then add the amount of your sugar or syrup cost adjustment to your adjusted base price, as adjusted for your raw material cost changes.

(e) *Your ceiling price.* The total of your adjusted base price, your raw material cost adjustment, and your sugar or syrup cost adjustment is your ceiling price, f. o. b. factory of origin.

If you process an item for which you have established a ceiling price under this section, and if you also acquire the same item from other sources, your ceiling price for the item determined under this section applies to all sales of the item.

(f) *Recalculation.* If, during the pack, your purchase price for the same grade or grades of raw material, changes from that which you were paying when you calculated your prevailing ceiling price for an item, you shall recompute your raw material cost adjustment for the item when your pack has reached an amount equal to 20 percent of your 1950 pack of the same item, (or if you did not pack the item in 1950, then an amount equal to 20 percent of your estimated 1951 pack of the item), and you shall again recompute your raw material cost adjustment immediately after you have completed your pack of the item. If either of these recomputations shows a decrease in raw material cost, you shall in each case immediately recalculate

your ceiling price for the item. If either of these recomputations shows an increase in raw material cost, you may, but you are not required to, recalculate your ceiling price for the item. In recalculating the ceiling price of an item under this subsection, you shall figure your weighted average cost of all of the raw material used in processing the item up to the time of your recomputation.

In any case of recalculation of your ceiling prices, no item may be delivered after the recalculation at a price higher than the recalculated ceiling price.

(g) *Items which are mixtures of more than one fruit or berry.* If you process an item which is a mixture of two or more fruits or berries, you calculate your ceiling price for such item as follows:

(1) Multiply your base price for the item determined under paragraph (a) of this section by the appropriate figure named in Table I in paragraph (b) of this section. The result is your adjusted base price for the mixture.

(2) Determine the raw material adjustment per ton (or other unit of purchase) in accordance with paragraph (c) of this section for each kind of fruit or berry in the mixture.

(3) Convert the raw material cost adjustment for each kind of fruit or berry in the mixture to a per unit basis in accordance with paragraph (c) (3) of this section, using as your yield the yield for each kind of fruit or berry as though it were processed separately.

(4) Multiply the result obtained for each kind of fruit or berry under subparagraph (3) of this paragraph by the percentage by weight of that kind of fruit or berry in the mixture and combine the amounts obtained by this multiplication. The result, which may be a plus or minus figure, is your raw material cost adjustment for the mixture.

(5) If the result of subparagraph (4) of this paragraph is a plus figure, you add that figure to your adjusted base price. If the result of subparagraph (4) is a minus figure, you subtract that figure from your adjusted base price.

(6) Compute your sugar or syrup adjustment in accordance with paragraph (d) of this section, and add this amount to your adjusted base price adjusted for raw material cost changes. The result is your ceiling price f. o. b. factory for the item.

SEC. 3. *Ceiling prices for base distributors.* You calculate your ceiling price for each item covered by this regulation by first determining your "base period" for the item. ("Base" is defined in paragraph (a) of this section). Thereafter, you adjust your "base period" by combining your "base price" with the difference between your 1948 and your 1951 "weighted average acquisition costs" of the item. ("Weighted average acquisition cost" for each of these years is defined in paragraph (b) of this section).

(a) *How base distributors determine their base price.* Your "base price" during the "base period", as this term is defined in section 26, is your "weighted average sales price" per unit of sale for the item sold during the base period to wholesalers.

Your "weighted average sales price" is the total gross sales dollars charged f. o. b. factory of origin, including no more than one month's storage charges, for the item during the base period divided by the number of units of sale represented thereby. You shall include in your weighted average sales price only the sales and sales contracts defined in section 2 (a) (1).

(b) *How base distributors determine their acquisition cost adjustment.* Next you determine the difference between your 1948 and 1951 "weighted average acquisition cost" for the item for each of these years. This cost is the total gross dollars paid by you for purchase of the item f. o. b. the factory of origin, including not more than one month's storage charges, divided by the total number of units of sale represented thereby. If your 1948 cost is greater than your 1951 cost, your difference is a minus figure. If your 1951 cost is greater than your 1948 cost, your difference is a plus figure.

Your 1948 weighted average acquisition cost is computed for the period from your first purchase of the item from the 1948 pack to the beginning of the 1949 pack of the item. Your 1951 weighted average acquisition cost is computed from the date of your first purchase of the item from the 1951 pack of the item to the beginning of the 1952 pack of the item, or to the date of calculating your ceiling price, whichever is earlier.

If you do not have a 1948 acquisition cost you may not price under this section.

(c) *Your ceiling price.* If the difference under paragraph (b) of this section is a minus figure, you subtract that figure from your base price for the item. If that difference is a plus figure, you add that figure to your base price for the item.

The result is your ceiling price for the item f. o. b. the factory of origin.

(d) *Recalculation.* If, during the 1951 pack of the item, your acquisition costs change from that which you were paying when you calculated your ceiling price for the item, you shall recompute your acquisition cost adjustments for the item when your purchases of the item have reached an amount equal to 20 percent of your 1950 purchases of the same item, and you shall again recompute your acquisition cost adjustment immediately after the completion of the 1951 pack of the item. If either of these recomputations shows a decrease in your acquisition cost, you shall in each case immediately recalculate your ceiling price for the item. If either of these recomputations shows an increase in your acquisition cost, you may recalculate your ceiling price for the item. In recalculating the ceiling price of an item under this paragraph, you shall compute the weighted average acquisition cost of all purchases of the item up to the time of your recomputation.

No item may be delivered after any recalculation of your ceiling price at a price higher than the recalculated ceiling price.

SEC. 4. *Ceiling prices for processors who purchase raw material on open-end contracts, grower-processors, and grower-owned cooperatives.*—(a) *Raw material adjustment.* (1) If you are a processor who purchases raw material on open-end contracts, you shall use your actual weighted average raw material costs for 1948, and 1951, and make your determination of your raw material cost adjustment in accordance with section 2. If you can determine your actual weighted average raw material cost for 1948 but cannot determine your 1951 costs because of facts not ascertainable at the time of calculating your ceiling prices, you shall borrow the 1951 weighted average raw material costs per ton (or other unit of purchase) of your nearest processor of the same kind of raw material in the same raw material area as set forth in Table II who has determined his weighted average raw material costs for these three years in accordance with section 2. You shall then use your actual 1948 costs and your borrowed 1951 costs and make your determination of your raw material cost adjustment in accordance with section 2.

(2) If you are a grower-processor or a grower-owned cooperative, and if in 1948 and 1951 you purchased at least 10 percent, by weight, of your total use of raw material of the product at prices definitely ascertainable at the time of making this computation, you shall use the weighted average purchases for each of these years as your weighted average raw material cost for each of these years and make your determination of your raw material adjustment in accordance with section 2. If, in any of these years, you did not have such purchases, but did make sales to other processors of the same kind of raw material in a total amount equal to or exceeding 10 percent, by weight, of the amount processed by you in such year, you may substitute the weighted average of such sales for such year.

(3) If you are a grower-processor or a grower-owned cooperative, and you cannot compute your raw material adjustment under subparagraph (2) of this paragraph, you shall borrow the raw material adjustment per ton (or other unit of purchase) of your nearest processor of the same kind of raw material in the same raw material area as set forth in Table II.

(b) *Your ceiling price.* In every case, after having obtained your raw material adjustment in accordance with the above paragraphs, you shall calculate your ceiling prices under the provisions of section 2.

(c) *Reports.* If you calculate your ceiling prices under the provisions of this section, you are required to comply with the reporting requirements of section 19.

(d) *Revision of ceiling prices.* Ceiling prices established under this section are subject to revision by the Director of Price Stabilization in accordance with section 7 (e) of this regulation.

SEC. 5. *Ceiling prices for products in new retail carton sizes.* If you sold the same product during the base period in an item or items which differed from the item being priced only in size of re-

tail carton, and if the size of such carton used during the base period was not more than 50 percent larger or smaller than the item now being priced, you calculate your ceiling price for the new item, as follows:

(a) Determine your raw material cost per unit of sale of the item sold during the base period (whether or not currently packed).

(b) Divide this raw material cost by the label weight of the item sold during the base period.

(c) Multiply this result by the label weight of the item you are pricing.

(d) Subtract the raw material cost from the base price per unit of sale of the item sold during the base period.

(e) Add the result in paragraph (d) to that secured in paragraph (c) of this section. This result is your base price for the new item. You shall then calculate your ceiling price for the item in accordance with section 2.

If you cannot price an item, not sold in the base period, under this section, you shall use the provisions of section 6 of this regulation.

SEC. 6. *Ceiling prices for sellers who are unable to calculate their ceiling prices under section 2, 3, 4 or 5 of this regulation.*—(a) *Processors.* If you are a processor and are unable to calculate your ceiling price for an item under sections 2, 4 or 5, you shall use as your ceiling price for that item the simple average of the ceiling prices for the same item, and for the same class of sale, of the three processors of the item who are most competitive with you and who are located in the same pricing area as you are. If there are only two such processors in the area, use the simple average of the two available ceiling prices. If there is only one such processor in the area, you may use his ceiling price.

(b) *Base distributors.* If you are a base distributor and are unable to calculate your ceiling price for an item under section 3, you shall use as your ceiling price for that item the simple average of the ceiling prices for the same item, of the three sellers (either processors or base distributors) who are most competitive with you and who are located in the same pricing area as you are. If there are only two such sellers in the area, use the simple average of the two available ceiling prices. If there is only one such processor in the area, you may use his ceiling price.

(c) *Revision of ceiling prices by the Director of Price Stabilization.* Ceiling prices established under this section are subject to revision by the Director of Price Stabilization in accordance with section 7 (e) of this regulation.

(d) *Application for ceiling prices.* If you are unable to obtain the ceiling prices of the required processors located near you, apply to the Fruit and Vegetable Branch, Office of Price Stabilization, Washington 25, D. C., for an individual authorization of a ceiling price in accordance with section 7 of this regulation.

(e) *Reports.* If you calculate your ceiling prices under the provisions of this section, you are required to comply with the reporting requirements of section 19.

SEC. 7. *Individual authorization of ceiling prices.* If you cannot determine your ceiling price for an item under any of the foregoing pricing methods of this regulation you shall, before delivering the item to any purchaser, apply to the Fruit and Vegetable Branch, Office of Price Stabilization, Washington 25, D. C., for a ceiling price for each item. This application shall be made on OPS Public Form No. Pub. 78 available at any Office of Price Stabilization office.

(a) *Information that must be given in all cases.* In all such cases, you shall submit, if available, the following information in your application.

(1) A description in detail of the item for which a ceiling price is sought; a statement of the facts that make it different from the most similar item for which you have determined a ceiling price, identifying the similar item and stating its ceiling price; and a statement giving the reasons why a ceiling price cannot be established under the pricing methods of this regulation. This statement shall indicate whether sales of the item have previously been made, and if so, whether you established a ceiling price under the General Ceiling Price Regulation, and if so, the ceiling price you so established for each class of purchaser and the number of the section of the General Ceiling Price Regulation under which you established such ceiling price.

(2) The 1948, 1950 and 1951 weighted average raw material costs per ton (or other unit of purchase) figured in the manner and subject to the limitations set forth in section 2 of this regulation, and a statement showing your current yield in units of sale.

(3) An itemized breakdown of your estimated total costs for 1951 computed in accordance with your customary accounting practice.

(4) The ceiling price you propose for the item, indicating whether it is for sale to wholesalers, or other classes of purchasers, and any discounts, or allowances that should be applicable to the proposed ceiling price and a list of your customary discounts, transportation and other allowances and price differentials.

(5) The volume of the item which you have on hand and which you expect to produce during the remainder of the pack year.

If you are unable to submit any of the required information, state why you are unable to do so.

(b) *Supplementary information must be given if specifically requested.* You shall mail to the Fruit and Vegetable Branch, Office of Price Stabilization, Washington 25, D. C., within 15 days after receipt of a request such additional information as shall be requested. If you fail, without reasonable explanation, to submit all additional information that may have been requested within 15 days after the request is mailed, your application shall be considered withdrawn and the docket closed. Unless the application is refiled, the docket will not be reopened upon later receipt of this information, and further consideration by the Office of Price Stabilization will not be given.

(c) *Disposition of application.* Upon receipt of your application, the Office of Price Stabilization will authorize a ceiling price, or a method of determining the ceiling price, for you or for sellers of the item generally. The ceiling price authorized shall be one that bears a proper relationship to those for comparable items and sellers.

Your proposed price shall be considered authorized 20 days after the application, or all additional information that may have been requested (whichever date is the later), is mailed by registered air mail, addressed to the Fruit and Vegetable Branch, Office of Price Stabilization, Washington 25, D. C., unless within that time, you have received from the Office of Price Stabilization a notice to the contrary.

(d) *Delivery before authorization of ceiling prices.* After filing the application, you may deliver the item and receive a payment of not more than 75 percent of the proposed price, but you may not receive further payment for it until a ceiling price is authorized.

(e) *Revision of prices by the Office of Price Stabilization.* Any ceiling price established under this section shall be subject to revision at any time by the Office of Price Stabilization.

SEC. 8. *Sales f. o. b. shipping points other than factory of origin.* If, during the base period, you sold, either as a processor or a base distributor, all or portions of an item at a shipping point other than the factory where the item was processed and if you did not, during the base period absorb the transportation costs from the factory to this shipping point, you shall, in calculating your ceiling price f. o. b. factory of origin, subtract from the base period sales price the transportation costs for the item from the factory of origin to such shipping point. Then add to your f. o. b. factory ceiling price, for all or any portion of the item sold f. o. b. such shipping point, the current transportation costs from the factory of origin to such shipping point.

SEC. 9. *Uniform f. o. b. factory prices for factories in different pricing areas.* (a) If you process the item being priced at more than one factory and if your ceiling prices for the item vary by factories located in different pricing areas, you may establish a uniform ceiling price for the item for any group of factories by figuring a weighted average of their separate ceiling prices.

(b) For any two or more factories selected by you, your "weighted average ceiling price" shall be figured by you as follows:

(i) Determine the total gross sales dollars which would have been obtained if your total production of the item at those factories during 1950 had been sold at the separate ceiling prices otherwise determined under this regulation and,

(ii) Divide that figure by the total number of units of sale of the item included in that 1950 total production.

The result is your uniform f. o. b. factory price.

(c) If you at any time recalculate your ceiling prices for an item under the provisions of section 2 of this regulation, you shall at that time recalculate your weighted average ceiling price under this section.

SEC. 10. *Delivered prices.* You may figure a delivered ceiling price by adding to the ceiling price for the item f. o. b. factory of origin, the amount of the current transportation charges per unit of sale of that item.

SEC. 11. *Uniform delivered pricing by zones or areas*—(a) *Sellers who sold during 1950 on a uniform delivered price by zones or areas*—(1) *For one factory.* If you sold or delivered an item covered by this regulation during 1950 on an established uniform delivered price basis by zones or areas, you may establish a delivered ceiling price for the same zones or areas by adding to your ceiling price f. o. b. factory of origin an average transportation charge, figured on the same basis as you figured such charge during 1950, but at current transportation rates. If you desire to sell an additional item not sold during 1950 on such uniform delivered price basis, you may establish a uniform delivered ceiling price for the same zones or areas, by adding to your f. o. b. factory of origin ceiling price for the item, transportation charges which are mathematically proportional by shipping weight to the charges which were added to an item of the nearest shipping weight sold on a uniform delivered price basis in 1950.

(2) *For two or more factories.* If you sold an item during 1950 from two or more factories on an established uniform delivered price basis, by zones or areas, regardless of the factories from which the shipment was made, you may continue such practice for the same zones or areas. Your uniform delivered ceiling price for the item shall be the weighted average of the delivered ceiling prices, as figured in subparagraph (1) of this paragraph, for the item computed on the basis of the proportion of production of the item in each of your respective factories in 1950.

SEC. 12. *Payment of brokers.* In each case, the amount paid by the buyer to the processor or base distributor plus any amount paid by the buyer for brokerage service to the broker shall not exceed the total of the processor's or base distributor's ceiling price and allowable transportation costs actually paid by the processor, base distributor or by the broker. The term "broker" includes a "finder."

SEC. 13. *Ceiling prices for specially packaged items*—(a) *Amount of adjustment.* If your buyer specifies, in writing, special packaging for government use other than standard packaging you shall adjust your ceiling price per unit of sale of the item as otherwise determined under this regulation if the special packaging required is lower in cost than standard packaging. "Packaging" and "standard packaging" are defined in paragraph (d) of this section. If the cost of standard packaging per unit of sale to you is greater than the cost of the required special packaging per unit of sale, you shall subtract such difference in cost from your ceiling price per unit of sale otherwise determined under this regulation. This result is your f. o. b. factory of origin ceiling price per unit of sale of the specially packaged item. If the cost of the required special packaging, per unit of sale, is greater than the cost of standard packaging per unit of sale, you may, but are not required to, add such difference in cost to your ceiling price per unit of sale otherwise determined under this regulation. The result is your f. o. b. factory of origin ceiling price per unit of sale of the specially packaged item.

(b) *Invoice and record-keeping requirements.* In any case where your ceiling price is adjusted under this section, you shall:

(1) Show separately the amount of the adjustment in your contract of sale or on your invoice.

(2) In addition to the records otherwise specified by this regulation, prepare and keep for inspection by the Office of Price Stabilization, for two years from the date of your invoice to the buyer, accurate records showing the cost of standard packaging and the cost of packaging according to the specifications of the buyer.

(c) *Computation of costs.* You shall compute your costs according to your established accounting methods. You must make allowances for any materials salvaged in unpacking and repacking.

(d) *Meaning of "packaging" and "standard packaging".* (a) "Packaging" means the providing of wrappings, inner cartons, outer cartons; the placing of commodities in such wrappings or cartons; the application of any special coverings or coatings; and any unpacking and repacking necessary to conform to the specifications of the buyer.

(b) "Standard packaging" means the most expensive packaging the cost of which was included in figuring the ceiling prices established by this regulation.

SEC. 14. *Fractions of a cent.* When calculating your ceiling prices, you shall carry out all amounts to four decimal places (hundredths of a cent). If any calculated ceiling price includes a fraction of a cent, you adjust your ceiling prices to the nearest quarter of a cent with respect to sales of items in institutional sizes and to the nearest half-cent in sales of items in consumer sizes. However, if you had an established method for quoting your sales prices during the base period, you may continue to adjust your ceiling price to the nearest cent or half-cent or quarter-cent in accordance with such established method.

SEC. 15. *Maintenance of customary discounts, allowances and price differentials.* You shall not change any customary allowance, discount or other price differential (as defined in section 26 of this regulation) to a purchaser or class of purchasers, if the change results in a higher price to that purchaser or class. However, this provision does not require you to sell any item unlabeled, or under a buyer's label, or to extend or duplicate any temporary promotional campaign.

SEC. 16. *Export sales.* The ceiling price at which you may export any item covered by this regulation shall be determined in accordance with Ceiling Price Regulation 61. (16 F. R. 7597)

SEC. 17. *Storage.* (a) You may not add to the ceiling price of items, storage costs on goods owned by you if customarily such costs were absorbed by you. For sales of an item on a storage basis (beyond one month's storage), you may adjust your ceiling price in accordance with your established practice by the amount of your current storage cost or your current storage standards for each item. You may compute such costs either on a monthly basis or an average yearly basis, provided that the average yearly basis shall not exceed a total of the charge for seven months storage, including the first month's storage charges.

(b) Storage by you of goods owned by the buyer shall be charged for in accordance with the rates provided by the ceiling price regulation applicable to such services.

SEC. 18. *Records which must be kept.* If you make sales covered by this regulation, you shall:

(a) Preserve for examination by the Office of Price Stabilization, for two years from the date of your invoice to the buyer, all records of the same kind as you have customarily kept, relating to the prices which you charged for those sales, and

(b) Preserve for examination by the Office of Price Stabilization for as long as the Defense Production Act of 1950, as amended, remains in effect, and for two years thereafter, all your existing records which were the basis of calculating your ceiling prices in the manner directed by this regulation, showing the method used in calculating the ceiling prices.

SEC. 19. *Reports which must be filed.* (a) If you determine ceiling prices for items covered by this regulation, you shall mail to the Fruit and Vegetable Branch, Office of Price Stabilization, Washington 25, D. C., a report on OPS Public Form No. Pub. 97 available at any office of the Office of Price Stabilization, for all items for which you determine ceiling prices under this regulation. All items of a particular product may be included on one form. However, you shall file a supplemental form if you calculate ceiling prices for some items of the particular product at a later date.

(b) You shall mail to the Fruit and Vegetable Branch, Office of Price Stabilization, Washington 25, D. C., the report required by this section for any item within 5 days after such item is offered for sale.

SEC. 20. *Sales slips and receipts.* If you have customarily given a purchaser a sales slip, invoice or similar evidence of purchase, you shall continue to do so. Upon request, you must, regardless of previous custom, give the purchaser a receipt showing the date, your name and address, the name and quantity of each item sold, and the price received for it.

SEC. 21. *Transfer of business.* If the business, assets or stock in trade of any person covered by this regulation, is sold or otherwise transferred to you on or after the effective date of this regulation, your ceiling prices for items covered by this regulation and processed or dealt in in the course of such business shall be the same as those which your transferor would have been required to use, and your obligation to keep records sufficient to verify such prices is the same. The transferor must either preserve and make available, or turn over, to you all records of transactions prior to the transfer which he has and which are necessary to enable you to comply with the record provisions of this regulation.

SEC. 22. *Adjustable pricing.* You may agree to sell at a price which can be increased up to the ceiling price in effect at the time of delivery, but you may not, unless authorized by the Office of Price Stabilization, deliver or agree to deliver at prices to be adjusted upward in accordance with action taken by the Office of Price Stabilization after delivery. Such authorization may be given when a request for a change in the applicable ceiling price is pending, but only if the authorization is necessary to promote production or distribution and will not interfere with the purpose of the Defense Production Act of 1950, as amended. The authorization may be given by the Director of Price Stabilization or by any official of the Office of Price Stabilization having authority to act upon the pending request for a change in price or to give the authorization. The authorization will be given by order, except that it may be given by letter or telegram when the contemplated action is the authorization of an individual ceiling price.

SEC. 23. *Treatment of excise taxes*—(a) *Taxes in effect during base period.* If, during the base period, you separately stated and collected any excise or similar tax you may continue to collect the current amount of any such tax in addition to your ceiling price. If you did not customarily, during the base period, state and collect separately from the purchase price the amount of tax paid by you, you may not collect the amount of such tax in addition to your ceiling price.

(b) *Taxes imposed since base period.* In all other cases, if at the time you calculate your ceiling price the statute or ordinance imposing the tax does not prohibit you from stating and collecting the tax separately from the purchase price, you may collect in addition to your ceiling price, the amount of the tax actually paid by you.

In every case where the tax is collected from the purchaser, the amount thereof shall be separately stated.

SEC. 24. *Compliance with this regulation*—(a) *No selling or buying above ceiling prices.* Regardless of any contract or obligation, no person shall sell or deliver or, in the course of trade, buy or receive any item at a price higher than the ceiling price established by this regulation.

(b) *Evasion.* No person shall evade a ceiling price, directly or indirectly, whether by commission, service, transportation, or other charge or discount, premium, or other privilege; by tie-in requirement or other trade understanding; by any change of style of pack; by a business practice relating to grading, labeling or packaging, or in any other way.

(c) *Enforcement.* Any person violating a provision of this regulation is subject to the criminal penalties, civil enforcement actions, and suits for treble damages provided by the Defense Production Act of 1950, as amended.

SEC. 25. *Petitions for amendments, protests and interpretations.* Any protest, petition for amendment, or request for interpretation of this regulation, may be filed in accordance with the provisions of Price Procedural Regulation 1, Revised (16 F. R. 9055).

SEC. 26. *Definitions.* When used in this regulation the term:

(a) "Base distributor" means a person other than a processor who purchases the item from a processor and sells the item to wholesalers and chain store buying agencies.

(b) "Base period" for an item means the 60-day period beginning with and including the first day you sold the item of the 1948 pack at a firm price.

(c) "Frozen fruit or berry" means a fresh fruit or berry which has been processed by a processor by subjecting the fruit or berry to temperatures below the freezing point so as to extend materially the period of its availability for consumption as a food. This term includes all fruits or berries which are so processed irrespective of the speed of freezing or the temperatures employed.

(d) "Grade" means the commercial grade or customary trade quality designation at the time of shipment. However, where the processor elects to use grades as established and defined by any governmental agency and sells the item under any such grade designation, the term "grade" means such grade at time of shipment.

(e) "Item" means a kind, variety, grade, size, style of pack, or container type or size, of a product. Brand names shall not in themselves constitute separate items.

(f) "Pack" of any year means the items obtained from the raw product, the major portion of which is processed during that calendar year.

(g) "Person" means an individual, corporation, partnership, association, or any other organized group of persons, and their legal successors or representatives. The term includes the United States, its agencies, other governments, their political subdivisions and their agencies.

(h) "Processor" means a person who is engaged commercially in preserving fruits or berries by processing by freezing so as to extend materially the period of its availability for consumption as a food. The term includes a person who has the item processed for him by another and who owns the raw material immediately prior to and throughout the processing.

(i) "Product" means the common and usual name of a finished food processed from a fruit or berry covered by this regulation.

(j) "Sales at retail" means sales to ultimate consumers other than commercial, industrial and institutional users.

(k) "Sales at wholesale" means sales with respect to which the processor has performed the function of selling as a wholesaler to retail stores, but not including sales to chain store buying agencies, or to associations of retail store buying agencies which warehouse the product prior to distribution to the individual retail outlet.

(l) "Same pricing area" means the same area, both for permitted increases other than raw material and for raw material permitted adjustments as set forth in Tables I and II.

(m) "Units of sale" means your customary invoicing quantities of the item, such as dozen, carton, pound, etc.

(n) "Weighted average raw material cost" means the total amount paid by the processor to the grower for the raw agricultural material plus any transportation, storage, harvesting, seeds and plants, freight, boxes, bags, acquisition, and other direct costs paid or incurred by the processor up to the point of delivery at his factory divided by the total tons (or other units of purchase) of raw material represented thereby.

(o) "You" or "Your" means any processor or other person whose sales are covered by this regulation.

Effective date. The effective date of this regulation is October 25, 1951, or such earlier date between October 11, 1951, and October 25, 1951, as you may select. If you select an earlier date, this regulation becomes effective as to you upon that date for all of your items covered by this regulation.

NOTE: The record-keeping and reporting requirements of this regulation have been approved by the Bureau of the Budget in accordance with the Federal Reports Act of 1942.

MICHAEL V. DISALLE,
Director of Price Stabilization.

OCTOBER 11, 1951.

[F. R. Doc. 51-12359; Filed, Oct. 11, 1951; 4:00 p. m.]

[General Ceiling Price Regulation, Amdt. 2 to Supplementary Regulation 25]

GCPR, SR 25—COUPON EXCHANGE RATES AND OTHER PREMIUM PROGRAMS

EXTENSION OF BASE PERIOD FOR COUPON EXCHANGE ADJUSTMENT

Pursuant to the Defense Production Act of 1950, as amended, Executive Order 10161 (15 F. R. 6105), and Economic Stabilization Agency General Order No. 2 (16 F. R. 738), this Amendment 2 to Supplementary Regulation 25 to the General Ceiling Price Regulation (16 F. R. 808) is hereby issued.

STATEMENT OF CONSIDERATIONS

This amendment to SR 25 to GCPR is designed to extend the base period for adjustment purposes under SR 25 to include the period January 1, 1950–January 25, 1951, inclusive. The present reg-

ulation permits an increase in the exchange rate of coupon redemption plans to reflect only the increased costs of premiums since the present base period of December 19, 1950–January 25, 1951. This amendment will allow cost increases incurred during or since the extended base period to be considered in adjusting present exchange rates.

The general practice among operators of these premium plans is to print a catalogue of premium articles being offered and to issue this catalogue only once a year or even less frequently. Catalogues printed in the Spring of 1950 or earlier do not reflect increased costs of premium articles incurred since their original issuance. These catalogues were in effect at the time of the issuance of the GCPR and therefore do not reflect earlier premium cost increases.

The reasons for the delay in reflecting such increased costs are due to the inherent difficulty of frequent reprinting and redistribution of new catalogues and, to the preference for stability in announced redemption values so long as costs do not rise disproportionately.

The Director of Price Stabilization has determined that it will be fair and equitable and in accord with the objectives of the Defense Production Act, as amended, if the base period for determining adjustments is extended so as to permit those companies concerned to reflect the total increased costs of premiums rather than only the portion of the increase incurred during the present base period of December 19, 1950 to January 25, 1951.

Section 3 of SR 25 has been rewritten in order to state more precisely the meaning intended by this section and to make this statement in terms which will be consistent with the other parts of the Regulation.

Prior to the issuance of this regulation, consultation was held with persons in the industry that may be involved in this amendment and due consideration was given to their recommendations.

AMENDATORY PROVISIONS

Supplementary Regulation 25 to the GCPR is amended in the following respects:

1. Section 2 is amended by deleting the phrase "the base period of December 19, 1950 to January 25, 1951, inclusive" and by substituting in its place the phrase "the base period of January 1, 1950 to January 25, 1951, inclusive."

2. Section 3 is amended to read as follows:

SEC. 3. *Determination of new coupon exchange rates.* (a) If the cost of your premium articles has increased since you calculated your coupon exchange rate on the basis of the lowest number of coupons required for redemption per unit of cost of premium article during the base period established in section 2 of this regulation, you may apply such base period exchange rate to the current unit cost to you of customary purchases of premium articles to determine their current redemption value in terms of coupons or coupons plus cash required.

(b) If you sell the premium article to the retailer who in turn redeems upon stated conditions the coupons, certificates or other tokens issued in connection with the sale of your merchandise, and the cost of the premium has now risen, you may:

(1) Increase the cost of the premium article to the retailer by the dollars and cents increase in the cost to you of that article over the cost to you during the base period for the same article; and

(2) Increase the conditions of redemption which the retailer may exact from his customer by permitting such retailer to apply his base period exchange rate, as determined under paragraph (a) of this section, to the current unit cost to him of customary purchases of such premium articles from you in order to determine their current redemption value in terms of coupons or coupons plus cash required.

For example, if during the base period a company gave a $1.00 dish away upon the presentation to the retailer of ten (10) coupons and ten (10) cents, such an arrangement would make the highest exchange value equivalent to one coupon being worth nine (9) cents per unit of premium cost. If the price of this dish has now risen to $1.10, the maintenance of this base period exchange rate requires that the new redemption values be, for example, ten (10) coupons and twenty (20) cents or eleven (11) coupons and eleven (11) cents.

(Sec. 704, 64 Stat. 816, as amended; 50 U. S. C. App. Sup. 2154)

Effective date: This Amendment 2 to SR 25 of GCPR shall become effective October 16, 1951.

MICHAEL V. DISALLE,
Director of Price Stabilization.

OCTOBER 11, 1951.

[F. R. Doc. 51-12358; Filed, Oct. 11, 1951; 11:32 a. m.]

Chapter IV—Salary and Wage Stabilization, Economic Stabilization Agency

Subchapter A—Salary Stabilization Board

[Interpretation 1]

INT. 1—EXEMPTION FROM SALARY STABILIZATION OF CERTAIN PHYSICIANS AND ATTORNEYS

EDITORIAL NOTE: Federal Register Document 51-12075, appearing at page 10126 of the issue for Thursday, October 4, 1951, has been changed in the following respects:

1. In the second sentence of section 1 (b) the word "chiropodists" has been changed to "chiropractors" so that the sentence now reads: "The exemption does not extend to the salaries and other compensation of employees engaged in the auxiliary branches of the medical profession, such as employed pharmacists, nurses, optometrists, dental technicians or chiropractors."

2. In the last sentence of section 1 (b) the word "chiropractors" has been changed to "chiropodists" so that the sentence now reads: "The salaries and other compensation of employed osteopaths and chiropodists (podiatrists) are exempt only when licensed under state law to practice their particular specialties."

Chapter VI—National Production Authority, Department of Commerce

[NPA Order M-47A, as Amended October 11, 1951]

M-47A—USE OF COPPER AND ALUMINUM IN CERTAIN CONSUMER DURABLE GOODS AND RELATED PRODUCTS

This order as amended is found necessary and appropriate to promote the national defense and is issued pursuant to section 101 of the Defense Production Act of 1950, as amended. In the formulation of this amended order, consultation with industry representatives has been rendered impracticable due to the need for immediate action and because the order affects many different trades and industries.

NPA Order M-47A, as last amended August 2, 1951, is hereby amended in the following respects: The words "iron and steel" are deleted from the title; sections 1 through 11 are deleted and new sections 1 through 7 are substituted therefor. List A and List B of the order are not affected. As so amended, NPA Order M-47A reads as follows:

Sec.
1. Purpose.
2. Definitions.
3. Prohibited use of copper and aluminum.
4. Applications for adjustment or exception.
5. Records and reports.
6. Communications.
7. Violations.

AUTHORITY: Sections 1 to 7 issued under sec. 704, 64 Stat. 816 as amended; 50 U. S. C. App. Sup. 2154. Interpret or apply sec. 101, 64 Stat. 799, as amended; 50 U. S. C. App. Sup. 2071; sec. 101, E. O. 10161, Sept. 9, 1950, 15 F. R. 6105, 3 CFR, 1950 Supp.; sec. 2, E. O. 10200, Jan. 3, 1951, 16 F. R. 61.

SECTION 1. *Purpose.* The purpose of this order is to prohibit the use of copper and aluminum for certain ornamental, decorative, nonfunctional, and nonoperational purposes.

SEC. 2. *Definitions.* As used in this order:

(a) "Person" means any individual, corporation, partnership, association, or any other organized group of persons, and includes any agency of the United States Government or of any other government.

(b) "Copper" means any of the copper and copper-base alloy brass mill products, copper wire mill products, and copper and copper-base alloy foundry products and powder, which are listed in Schedule I of CMP Regulation No. 1, as amended from time to time.

(c) "Aluminum" means the various types of aluminum listed in Schedule I of CMP Regulation No. 1, as amended from time to time.

SEC. 3. *Prohibited use of copper and aluminum.* (a) No person who produces any product included in List A or List B of this order or who produces any part

specifically designed for use in any such product shall:

(1) Use copper or aluminum, or any part containing either such material, for any ornamental or decorative purpose, except in an end-product which is primarily ornamental or decorative and is not ordinarily permanently attached to or used as a part of another end-product; or

(2) Subject to the same exception as is stated in the preceding subparagraph, use a greater quantity of copper or aluminum, or any part containing a greater quantity of either such material, than is necessary for functional or operational purposes; or

(3) Use a better grade of copper or aluminum, or any part containing a better grade of either such material, than is necessary for functional or operational purposes.

(b) Paragraph (a) of this section shall not apply to the production of any CMP Class B product which is included in Schedule I of NPA Order M–47B, and is therefore subject to the provisions of section 5 of that order.

SEC. 4. *Applications for adjustment or exception.* Any person affected by any provision of this order may file a request for adjustment or exception upon the ground that such provision works an undue or exceptional hardship upon him not suffered generally by others in the same trade or industry, or that its enforcement against him would not be in the interest of the national defense or in the public interest. In examining requests for adjustment which claim that the public interest is prejudiced by the application of any provision of this order, consideration will be given to the requirements of the public health and safety, civilian defense, and dislocation of labor and resulting unemployment that would impair the defense program. Each request shall be in writing, in triplicate, shall set forth all pertinent facts and the nature of the relief sought, and shall state the justification therefor.

SEC. 5. *Records and reports.* (a) Each person participating in any transaction covered by this order shall retain in his possession for at least 2 years, records of receipts, deliveries, inventories, and use, in sufficient detail to permit an audit that determines for each transaction that the provisions of this order have been met. This does not specify any particular accounting method, nor does it require alteration of the system of records customarily maintained, provided the system assures an adequate basis for audit. Records may be retained in the form of microfilm or other photographic copies instead of the originals by those persons who have maintained or who may maintain such microfilm or other photographic records in the regular and usual course of business.

(b) All records required by this order shall be made available at the usual place of business where maintained for inspection and audit by duly authorized representatives of the National Production Authority.

(c) Persons subject to this order shall make such records and submit such reports to the National Production Authority as it shall require, subject to the terms of the Federal Reports Act of 1942 (5 U. S. C. 139–139F).

SEC. 6. *Communications.* All communications concerning this order shall be addressed to the National Production Authority, Washington 25, D. C., Ref: M–47A.

SEC. 7. *Violations.* Any person who wilfully violates any provision of this order or any other order or regulation of the National Production Authority, or who wilfully conceals a material fact or furnishes false information in the course of operation under this order is guilty of a crime and, upon conviction, may be punished by fine or imprisonment or both. In addition, administrative action may be taken against any such person to suspend his privilege of making or receiving further deliveries of materials or of using facilities under priority or allocation control, and to deprive him of further priorities assistance.

NOTE: All reporting and record-keeping requirements of this order have been approved by the Bureau of the Budget in accordance with the Federal Reports Act of 1942.

This amendment shall take effect October 11, 1951.

NATIONAL PRODUCTION AUTHORITY
By JOHN B. OLVERSON,
Recording Secretary.

The items in List A and List B, made in whole or in part from metal products or containing parts made wholly or partly therefrom, are subject to the provisions of this order. (Joining hardware is not considered "parts" within the meaning of List A or List B.) The listing following each Arabic numeral shall be considered a separate item hereunder.

LIST A

I. Metal and Wood Household Furniture (Excluding Bedsprings, Mattresses, and Dual-Purpose Sleeping Equipment)

1. Household furniture predominantly of wood materials, including upholstered furniture (excluding products using less than 5 percent of iron and steel parts by weight, not including weight of joining hardware; and excluding wood beds with metal bedrails), and including but not limited to living room, dining room, kitchen, breakfast room, and bedroom furniture.

2. Household furniture predominantly of metal materials, including upholstered furniture, including but not limited to beach, recreation room, kitchen, sunroom, garden, porch, and lawn furniture.

II. Other Furniture and Fixtures (Excluding Medical, Dental, and Hospital Specialities, Bedsprings, Mattresses, and Dual-Purpose Sleeping Equipment)

1. Restaurant furniture and fixtures, including tray stands and serving tables.

2. Barber shop and beauty shop furniture especially designed for such use, including but not limited to manicure tables, dresserettes, hydraulic and reclining chairs, and couch units.

3. Soda fountain, counter, bar, beer and other malt beverage-dispensing equipment and fittings (including bar rails).

4. All other office, commercial, or industrial furniture, including but not limited to: all types of desks; stools; sofas; bookcases; tables; chairs; stands; booths; filing cabinets; transfer cases (including card and document cases); clothing racks; costumers; and theater, auditorium, stadium, and grandstand chairs and seats, ganged and single, indoor or outdoor types, including portable bleachers; flower pots, boxes, stands, and holders for same; and window boxes; but excluding seats and desks designed for school use.

III. Partitions, Shelving, Lockers, and Fixtures (Excluding Medical, Dental, and Hospital Specialties)

1. Lockers; partitions and shelving (excluding specially designed factory partitions and shelving); book stacks; luggage racks; household cabinets, such as kitchen, wardrobe, broom, and medicine cabinets; and telephone booths.

2. Show and display cases (including wall types), show and display tables, and counters.

3. Store and office decorative and ornamental fixtures.

IV. Appliances, Machines, and Equipment

1. Cooking stoves, ranges, combination cooking stoves, and combination ranges (domestic).

2. Small household-type electric appliances, including but not limited to: broilers, coffee percolators and urns; hot plates and disc stoves; roasters; toasters; waffle irons; sandwich grilles; cookers; casseroles; food mixers; juice extractors; drink mixers and whippers; hand hair dryers; vibrators; non-industrial electric air space heaters; electric steam radiators; heating pads; flat irons, including steam irons; immersion heaters and portable electric water heaters (excluding dry shavers).

3. Electric fans (except industrial types), including all desk-bracket, wall, pedestal, and floor or hassock fans under 16 inches; and attic, household, window ventilating, and kitchen exhaust fans of all sizes.

4. Floor waxing and polishing machines, furniture polishers, vacuum cleaners, and carpet sweepers (household).

5. Portable electric lamps, including office types, such as floor, bridge, desk, torch, and table; pin-up lamps; lamp shades; and incandescent vehicular lighting equipment.

6. Home laundry equipment, including but not limited to clothes dryers (gas and electric), mechanical ironers and mangles, electric and gasoline type washing machines, ironing boards, wash boards, drain boards, and washing boilers; dishwashing machines, automatic food and garbage disposal units, and water softeners (household).

7. Household refrigerators, mechanical and ice, and cabinets for household refrigerators sold separately; home and farm food freezers (under 13 cubic foot capacity) and cabinets for same sold separately; bottled beverage coolers (all types); and bulk beverage dispensers (all types).

8. Packaged air conditioning units (window and console types ¾ horsepower and under); dehumidifiers for home and office including self-contained types with complete refrigeration cycle.

9. Clothes poles and clothes hanging dryers.

10. Flexible cord sets; coated electric tubing; and Christmas tree lighting outfits.

V. Utensils and cutlery

1. Cooking and kitchen utensils (excluding hospital specialties).

2. Silverware (excluding religious), including but not limited to: flatware, hollow ware novelties, toilet ware, and trophies.

3. Plated ware (excluding religious), including but not limited to: flatware, hollow ware, novelties, toilet ware, and trophies.

4. Table and kitchen cutlery, such as all types of knives, forks, spoons, and carving sets; pocket knives; and cutlery handles.

5. Vacuum bottles and jugs over one quart, and silverware and plated ware types of all sizes; picnic boxes, kits, trunks, jugs, grills, and equipment.

VI. Radio, television, and phonographs

1. Radio receivers, home, portable, and broadcast band automobile receivers; radio-phonograph combinations (including combinations with recorders).

2. Television receivers; radio-television receivers; television-phonograph combination (including combinations with recorders); and radio-television-phonograph combinations (including combinations with recorders); color adapters and converters; and UHF adapters and converters.

3. Phonographs and record players, and phonograph needles and cutting styli.

VII. Transportation equipment

1. Motorcycles, motor scooters, motor bikes.

2. Bicycles.

3. Ships, boats and canoes, except military and commercial, including fittings of all kinds, fastenings, and hardware for same.

4. Aircraft, except military and commercial.

VIII. Miscellaneous Items

1. Automatic merchandising machines; coin-operated scales; home bathroom scales; nonmechanical and nonelectrical beverage coolers; household, nonelectric ice cream freezers; and coin operated musical devices or machines.

2. All games, toys, toy whistles, and children's vehicles (not including baby carriages, walkers, and strollers, not of play or toy type).

3. Jewelry (except religious goods); jewelry cases; novelties; ornaments; souvenirs; insignia, decorations, emblems, medals, and badges (except religious, protective services, and military); jewelers' findings and materials; buttons and button parts, civilian type (except machine-attached tack buttons, and rivets and burrs for the work-clothing industry); dress ornaments and fittings; millinery accessories and frames; statues and statuettes; artificial flowers; key chains and catches, and fasteners therefor.

4. Garden tools, lawn mowers, rollers, seeders, and tampers; hedgeclippers and snips; lawn and garden hose accessories, such as sprinklers, nozzles, couplings, clamps, menders, and reels.

5. Musical instruments, including equipment, stands, and cases; chimes and bells.

6. Pianos and organs, including parts and materials.

7. Paper weights; penholders and desk sets (excluding pens, mechanical pencils, and pen points contained therein); desk and document trays; letter openers; smokers' articles such as: ash trays, cigar tubes and cases, cigarette and match cases, holders, lighters, tobacco pipes, pipe cleaners, humidors, and smoking stands; match, cigarette, and typewriter ribbon boxes; book-ends, calendars, calendar stands, and desk pads; shoe stretchers and trees.

8. Venetian blinds, slats, fittins and accessories; and shades.

9. Fireplace fixtures and equipment, such as dampers, irons, and fire screens.

10. Sporting and athletic goods; weight reducing and exercising machines; rowing machines.

11. Morticians' goods and equipment such as caskets, coffins, urns, vaults, liners, and memorial tablets (excluding morticians' instruments, supplies, and wooden coffin hardware).

12. Signs, markers, and advertising displays (excluding safety and traffic control signs and markers); metal letters, numbers, and plates (except for industrial or public utility control, identification, or instruction).

13. Mirror and picture frames.

14. Garment hangers, hooks, brackets, racks, and rods; wire guards; wire florists' designs; bird and pet cages, houses, aquariums, accessories and equipment.

15. Grocery and retail market type baskets and carts.

16. Gambling and amusement devices or machines.

17. Luggage and trunks; handbags and purses; and small leather goods.

18. Beverage mixing and serving equipment such as coasters, bottle coolers, cocktail shakers, ice buckets and pails, and ice chippers and shavers.

19. Awnings and canopies.

20. Containers for bath salts, cosmetics (except collapsible tubes), gifts, and powder.

21. Bathroom accessories including soap dishes; tooth brush, tumbler and paper holders; and towel bars.

22. Binoculars and opera glasses (except precision types).

23. Umbrellas, parasols, walking sticks, canes, and batons; weather vanes; sundials; arbors and trellises.

24. Mops; mud scrapers; stairs and threshold treads and edging; cuspidors; and tags, collars, and harness for pets.

25. Clothes hampers; clothes-line hardware and clothespins; curtain and drapery hardware including fasteners, rods, and rings; carpet hardware; furniture grommets; robe hooks.

26. Hair brushes and combs; dresser sets; hair curlers, beauty cream jars; mesh bags; atomizers (except for medicinal purposes and for use in the preparation of dried milk and dried eggs).

27. Cups and soda fountain cup holders; flasks.

28. Any other end-product not included in any item in List A or List B of this order, as to a person who receives no CMP allotment for such product for the third quarter, and any other product on the Official CMP Class B Product List not included in any item in List A or List B of this order, whether or not such product is an end-product, as to a person who receives no CMP allotment for such product for the third quarter. (The term "end-product" shall not include any product normally incorporated as a part, component, or subassembly of any other product, whether or not such other product is included in any item in List A or List B of this order.) However, this item shall not include any product covered by NPA Order M-68.

IX. Accessories

1. Accessories for any single item in this list A shall constitute a separate item for the purposes of this order, and shall also be an item separate from the item to which it is an accessory.

2. Automobile accessories including but not limited to radio-antennae, heaters, defrosters, lighters, curb feelers, radiator ornaments, etc.

NOTE: With respect to items in this list A, an "accessory" shall mean any product not specifically listed in List A or List B which is used with or attachable to an item described in this list A or to a "passenger car" as defined in NPA Order M-68, and which is generally known in the trade as an "accessory".

LIST B

1. Pails, ash and gargage cans (except shipping containers), household buckets, washing tubs and tub covers; spray guns (except paint-spraying equipment and agricultural sprays).

2. Household furniture predominantly of wood materials (including upholstered furniture) using less than 5 percent of iron and steel parts by weight, not including weight of joining hardware; wood beds with metal bedrails.

3. Dual-purpose sleeping equipment.

4. Furniture and fixtures designed for medical, dental, and hospital use (medical, dental, and hospital specialties).

5. Partitions and shelving specially designed for factory use.

6. Furniture and cabinet hardware, including casters, caster cups, glides and floor protective devices; and casket and casket shell hardware.

7. Baby carriages, walkers, and strollers.

8. Hospital specialty cooking and kitchen utensils.

9. Sewing machines, household.

10. Farm food freezers, 13 cubic feet, and over.

11. Safety and traffic control signs and markers.

12. Incandescent hand portable lighting equipment (such as flashlights, lanterns, miners' and emergency warning hand portable lights); nonelectric lighting equipment, civilian type (such as: carbide, gasoline, and kerosene lamps and lanterns; nonelectric lighting equipment parts and accessories; and nonelectric lighting reflectors); lamp components, including cold cathode fluorescent lamp electrodes, electric lamp bases, and all electric lamp components except bulb blanks.

13. Domestic electric automatic controls for air conditioning, heating, and refrigeration.

14. Bottling machinery (except dairy).

15. Beauty and barber shop equipment (except products included in list A) such as: cold waving end wraps, processing caps and rods, hair clippers, lather mixers, permanent waving equipment and supplies, and manicure implements.

16. Clocks, clock cases, watches, and watchcases, including movements and parts.

17. Safety razors, blades, and blade magazines.

18. Electric dry shavers.

19. Electric fans (except industrial) other than types and sizes included in list A.

20. Home workshop machine tools and home woodworking machinery.

21. Stationery tablets, greeting cards, and related products; library and loose-leaf binders; lead pencils; pens, mechanical pencils, and pen points; paper clips; hand stamps; marking branding irons; marking dies; stamping and inking pads; stencil marking devices; and rubber and metal stamps.

22. Flat glass, except plate and sheet.

23. Brooms and brushes (except for types used in electric motors and generators).

24. Buttons and button parts (only machine-attached tack buttons, and rivets and burrs for the work clothing industry.)

25. Horse-drawn buggies, sleighs, and sulkies.

26. Vacuum bottles and jugs, one quart and under (other than silverware and plated ware type); lunch boxes for industrial and school use.

27. Religious jewelry, and religious, protective services, and military badges, insignia, decorations, emblems, and medals.

28. Commercial fishing tackle and gear.

29. Religious ware, including but not limited to altar vessels and communion ware.

NOTE: With respect to items in this List B, an "accessory" shall mean any product not specifically listed in List A or in List B of this order which is used with or attachable to an item described in this List B and which is generally known in the trade as an "accessory."

[F. R. Doc. 51-12351; Filed, Oct. 11, 1951; 11:15 a. m.]

TITLE 42—PUBLIC HEALTH

Chapter I—Public Health Service, Federal Security Agency

PART 21—COMMISSIONED OFFICERS

PRESCRIPTION OF NUMBERS IN GRADE

Section 21.111 of Subpart G is amended to read as follows:

§ 21.111 *Prescription of numbers in grade.* The following maximum number of officers is authorized to be on active duty in the Regular Corps in each of the grades from the junior assistant grade to the director grade, inclusive, during the fiscal year beginning July 1, 1951, and ending June 30, 1952:

Director Grade	225
Senior Grade	450
Full Grade	405
Senior Assistant Grade	330
Assistant Grade	60
Junior Assistant Grade	30

(Sec. 206, 58 Stat. 694, as amended; 42 U. S. C. and Sup. 207)

This amendment shall be effective as of July 1, 1951.

[SEAL] W. P. DEARING,
Acting Surgeon General.

Approved: October 8, 1951.

JOHN L. THURSTON,
Acting Federal Security Administrator.

[F. R. Doc. 51-12262; Filed, Oct. 11, 1951; 8:47 a. m.]

PROPOSED RULE MAKING

DEPARTMENT OF THE INTERIOR

Bureau of Indian Affairs

[25 CFR Parts 14, 15]

ATTORNEYS AND AGENTS

NOTICE OF PROPOSED RULE MAKING

Notice is hereby given that the time for submitting written comments on the proposed regulations dealing with attorneys and agents for Indian tribes, Title 25, Code of Federal Regulations, Parts 14 and 15, that were published in the FEDERAL REGISTER on August 11, 1951, as extended to October 10, 1951 (16 F. R. 9250), is extended for an additional 30 days, to and including November 9, 1951.

OSCAR L. CHAPMAN,
Secretary of the Interior.

OCTOBER 9, 1951.

[F. R. Doc. 51-12255; Filed, Oct. 11, 1951; 8:45 a. m.]

DEPARTMENT OF AGRICULTURE

Production and Marketing Administration

[7 CFR Part 905]

[Docket No. AO-209-A3]

HANDLING OF MILK IN OKLAHOMA CITY, OKLA., MARKETING AREA

NOTICE OF HEARING ON PROPOSED AMENDMENTS TO TENTATIVE MARKETING AGREEMENT AND TO THE ORDER, AS AMENDED

Pursuant to the Agricultural Marketing Agreement Act of 1937, as amended (7 U. S. C. 601 et seq.), and the applicable rules of practice and procedure governing the formulation of marketing agreements and marketing orders (7 CFR Part 900), notice is hereby given of a public hearing to be held in Room 609, County Courthouse, 321 Northwest First Street, Oklahoma City, Okla., beginning at 10:00 a. m., October 16, 1951, for the purpose of receiving evidence with respect to emergency and other economic conditions which relate to the handling of milk in Oklahoma City, Okla., marketing area and to the proposed amendments hereinafter set forth, or appropriate modifications thereof, to the tentative marketing agreement heretofore approved by the Secretary of Agriculture and to the order, as amended, regulating the handling of milk in the Oklahoma City, Okla., marketing area. These proposed amendments have not received the approval of the Secretary of Agriculture.

Amendments to the order, as amended, for the Oklahoma City, Okla., marketing area have been proposed as follows:

By the Central Oklahoma Milk Producers Association: That the price for Class I milk be increased to at least $6.50 per hundredweight through February 1952.

By the Dairy Branch, Production and Marketing Administration: Make such other changes as may be required to make the entire marketing agreement and the order conform with any amendments thereto which may result from this hearing.

Copies of this notice of hearing and of the tentative marketing agreement, and the order now in effect, may be procured from the market administrator, 227 Northwest Twenty-third Street, Room 202, Oklahoma City, Oklahoma, or from the Hearing Clerk, United States Department of Agriculture, Room 1353 South Building, Washington 25, D. C., or may be there inspected.

Filed: October 9, 1951, Washington, D. C.

[SEAL] ROY W. LENNARTSON,
Assistant Administrator.

[F. R. Doc. 51-12295; Filed, Oct. 11, 1951; 8:54 a. m.]

FEDERAL SECURITY AGENCY

Public Health Service

[42 CFR Part 71]

FOREIGN QUARANTINE

PSITTACINE BIRDS; DISPOSITION OF EXCLUDED BIRDS

Notice is hereby given that the Surgeon General of the Public Health Service, with the approval of the Federal Security Administrator, proposes to amend §§ 71.152 and 71.153 of the Public Health Service regulations (42 CFR 71.152, 71.153) as indicated below. Interested persons may submit written data, views, or arguments in regard to the proposed amendments to the Surgeon General of the Public Health Service, Washington 25, D. C., not later than 15 days after the publication of this notice in the FEDERAL REGISTER.

1. Section 71.152 would be revised to read as follows:

§ 71.152 *Psittacine birds.* (a) The term psittacine birds shall include all birds commonly known as parrots, Amazons, Mexican double heads, African grays, cockatoos, macaws, parakeets, love birds, lories, lorikeets, and all other birds of the psittacine family.

(b) Except as provided in subparagraphs (1), (2) and (3) of this paragraph, psittacine birds shall not be brought into the continental United States, its territories, or possessions (other than the Canal Zone) from any foreign country or from the Canal Zone.

(1) Birds may be brought in for purposes of medical research under conditions prescribed by the Surgeon General to minimize risk of psittacosis infection if the importer has applied on prescribed forms for permission to bring them in and has received a permit from the Surgeon General specifying the number and species of birds that may be brought in.

(2) Birds destined for a zoological park may be brought in if they appear to the quarantine officer to be in good health and if the importer has applied on prescribed forms for permission to bring them in, describing adequate precautions to be taken to prevent transmission of psittacosis, and has received a permit from the Surgeon General specifying the number and species of birds that may be brought in. On arrival at the zoological park the birds shall promptly be isolated for at least thirty days where they will not have contact with other birds or with the public; any bird in isolation which displays symptoms suggestive of psittacosis shall be destroyed and submitted to a competent laboratory for examination. A report of such examination shall be made promptly to the Surgeon General.

(3) Birds not destined for a zoological park and not intended for medical research may be brought in by the owner of the birds if they do not exceed two in number; if the owner has submitted a sworn statement that he has not brought in any other birds under this paragraph in the preceding twelve months, that the

birds have been in his possession for the preceding four months, and that they are not intended for sale in the United States; and if they appear to the quarantine officer to be in good health.

2. Section 71.153 would be revised to read as follows:

§ 71.153 *Psittacine birds; disposition of excluded birds.* Psittacine birds prohibited from entry under the regulations in this part shall be destroyed or denied entry. Birds that have been denied entry or that have been in contact with sick or infected birds during shipment shall be held in isolation at the owner's expense under conditions approved and for periods of time prescribed by the Surgeon General. Any birds so isolated which display symptoms suggestive of psittacosis shall be destroyed.

(Sec. 215, 58 Stat. 690; 42 U. S. C. 216. Interpret or apply secs. 361–369, 58 Stat. 703–706; 42 U. S. C. 264–272)

[SEAL] W. P. DEARING,
Acting Surgeon General.

Approved: October 8, 1951.

JOHN L. THURSTON,
Acting Federal Security Administrator.

[F. R. Doc. 51-12265; Filed, Oct. 11, 1951; 8:47 a. m.]

[42 CFR Part 72]

INTERSTATE QUARANTINE

PSITTACINE BIRDS

Notice is hereby given that the Surgeon General of the Public Health Service, with the approval of the Federal Security Administrator, proposes to amend § 72.22 of the Public Health Service regulations (42 CFR 72.22) as indicated below. Interested persons may submit written data, views, or arguments in regard to the proposed amendment to the Surgeon General of the Public Health Service, Washington 25, D. C., not later than 15 days after the publication of this notice in the FEDERAL REGISTER.

1. Section 72.22 would be revised to read as follows:

§ 72.22 *Psittacine birds.* (a) The term psittacine birds shall include all birds commonly known as parrots, Amazons, Mexican double heads, African grays, cockatoos, macaws, parakeets, love birds, lories, lorikeets, and all other birds of the psittacine family.

(b) No person shall transport, or offer for transportation, in interstate traffic any psittacine bird unless the shipment is accompanied by a permit from the State health department of the State of destination where required by such department.

(c) Whenever the Surgeon General finds that psittacine birds or human beings in any area are infected with psittacosis and there is such danger of transmission of psittacosis from such area as to endanger the public health, he may declare it an area of infection. No person shall thereafter transport, or offer for transportation, in interstate traffic any psittacine bird from such area, except shipments authorized by the Surgeon General for purposes of medical research and accompanied by a permit issued by him, until the Surgeon General finds that there is no longer any danger of transmission of psittacosis from such area. As used in this paragraph, the term "area" includes, but is not limited to, specific premises or buildings.

(Sec. 215, 58 Stat. 690; 42 U. S. C. 216. Interprets or applies sec. 361, 58 Stat. 703; 42 U. S. C. 264)

[SEAL] W. P. DEARING,
Acting Surgeon General.

Approved: October 8, 1951.

JOHN L. THURSTON,
Acting Federal Security Administrator.

[F. R. Doc. 51-12266; Filed, Oct. 11, 1951; 8:48 a. m.]

NOTICES

DEPARTMENT OF THE TREASURY

United States Coast Guard

[CGFR 51-47]

NAVIGATION AND VESSEL INSPECTION LAWS AND REGULATIONS APPLICABLE IN ALASKA

HEARING

1. The Commander, 17th Coast Guard District, United States Coast Guard, will hold a public hearing at 10:00 a. m., P. s. t., on Wednesday, October 24, 1951, in the Territorial Senate Chamber, Federal Building, Juneau, Alaska, for the purpose of receiving comments on and discussing matters pertaining to the maritime industry which are peculiar to Alaska, and over which the Coast Guard has jurisdiction.

2. The following subjects will be considered at this hearing:

(a) Application and administration of marine inspection requirements to the merchant marine in Alaska.

(b) Classification of the waters of southeastern Alaska for inspection and navigation purposes.

3. All persons interested in the marine industry in Alaska are invited to attend this hearing. It will be appreciated if interested persons or parties will inform the Commander, 17th Coast Guard District, Post Office Box 2991, Juneau, Alaska, whether or not they will attend or have a representative present, stating name and position in their organization (if any), and if time is desired to present comments orally. Briefs or written comments will be welcomed from those present at this hearing or from those unable to attend.

Dated: October 8, 1951.

[SEAL] MERLIN O'NEILL,
Vice Admiral, U. S. Coast Guard, Commandant.

[F. R. Doc. 51-12281; Filed, Oct. 11, 1951; 8:49 a. m.]

DEPARTMENT OF AGRICULTURE

Farmers Home Administration

DISSOLUTION OF JOINT INVESTMENT RELATIONSHIPS

Pursuant to the authorities contained in the transfer agreements between the various State Rural Rehabilitation Corporations and the Government, section 2 (f) of the Farmers Home Administration Act of 1946 (60 Stat. 1064), the Rural Rehabilitation Corporation Trust Liquidation Act (64 Stat. 98), and the Order of the Secretary of Agriculture dated June 12 ,1950 (15 F. R. 3815), it is hereby ordered that all remaining joint investment relationships between the Government and the various State Rural Rehabilitation Corporations with respect to assets in which the Government's investments are now under the jurisdiction of the Farmers Home Administration, are hereby dissolved. An undivided interest in each item of such remaining joint investment assets is hereby declared to be established and distributed proportionately to the appropriate Corporation and to the Government.

In cases in which the remaining joint investment in a particular project asset was taken into consideration in establishing the State-wide investment ratio on the basis of which the prior dissolution of joint investments in other project assets was made, the remaining joint investment in that particular project asset is hereby dissolved on the basis of that State-wide investment ratio. In cases in which the remaining joint investment in a particular asset was not taken into consideration in establishing the State-wide investment ratio on the basis of which the prior dissolution of certain joint investments in other assets was made, the remaining joint investment in the particular asset is hereby dissolved on the basis of the investment ratio applicable to the particular asset. In either case the respective interest of the Government and the Corporation in the particular asset shall, hereafter until converted to cash, be a specific undivided interest.

Done at Washington, D. C., this 3d day of October 1951.

[SEAL] DILLARD B. LASSETER,
Administrator, Farmers Home Administration.

[F. R. Doc. 51-12284; Filed, Oct. 11, 1951; 8:50 a. m.]

DEPARTMENT OF LABOR

Wage and Hour Division

LEARNER EMPLOYMENT CERTIFICATES

ISSUANCE TO VARIOUS INDUSTRIES

Notice is hereby given that pursuant to section 14 of the Fair Labor Standards Act of 1938, as amended (52 Stat. 1068, as amended; 29 U. S. C. and Supp. 214) and Part 522 of the regulations issued thereunder (29 CFR Part 522), special certificates authorizing the employment of learners at hourly wage rates lower than the minimum wage rates applicable under section 6 of the act have been issued to the firms listed below. The employment of learners under these certificates is limited to the terms and conditions therein contained and is subject to the provisions of Part 522. The effective and expiration dates, occupations, wage rates, number or proportion of learners, and learning period for certificates issued under the general learner regulations (§§ 522.1 to 522.14) are as indicated below; conditions provided in certificates issued under special industry regulations are as established in these regulations.

Single Pants, Shirts and Allied Garments, Women's Apparel, Sportswear, Rainwear and Other Odd Outerwear, Robes and Leather and Sheep-Lined Garments Divisions of the Apparel Industry Learner Regulations (29 CFR 522.160 to 522.166, as amended September 25, 1950; 15 F. R. 5701; 6326).

Allen Garment Co., College Street, Franklin, Ky., effective 10–9–51 to 10–8–52; 10 percent of the productive factory force for normal labor turnover (men's and boys' sport shirts).

Art Pleating and Stitching, 126 North Tenth Street, Reading, Pa., effective 9–27–51 to 9–26–52; for normal labor turnover, five learners (dresses).

Bamuel Dress Co., corner Willow and Grant Streets, Olyphant, Pa., effective 10–6–51 to 10–5–52; 10 percent of the productive factory force for normal labor turnover (ladies' inexpensive dresses).

William Barry, Inc., 50 Island Street, Lawrence, Mass., effective 9–27–51 to 9–26–52; for normal labor turnover, 10 learners (wool and rayon jackets).

Biflex Johnston, Inc., Johnston, S. C., effective 10–13–51 to 10–12–52; for normal labor turnover, 10 percent of the productive factory force (brassieres and corsets).

Jack Borgenicht, Inc., 606 Poplar Street, Mayfield, Pa., effective 10–1–51 to 9–30–52; 10 learners (ladies' and children's dresses).

Bruce Co., Inc., 120 East Fifteenth Street, Ottawa, Kansas, effective 9–28–51 to 9–27–52; 10 percent of the productive factory force for normal labor turnover (men's work clothing).

Clover Dress Co., 92 South Empire Street, Wilkes-Barre, Pa., effective 10–12–51 to 10–11–52; 10 percent of the productive factory force for normal labor turnover (women's dresses).

Duryea Dress Co., 705 Main Street, Duryea, Pa., effective 9–28–51 to 9–27–52; five learners (ladies' dresses).

Elder Manufacturing Co., Webb City, Mo., effective 9–28–51 to 9–27–52; 10 percent of the productive factory force for normal labor turnover (boys' shirts and waists).

Holiday Wear, Inc., Ridgeland, S. C., effective 9–28–51 to 9–27–52; 10 learners (children's cotton sportswear dresses).

Lance Manufacturing Co., Room 970, Wyoming Avenue, Forty-Fort, Pa., effective 10–13–51 to 10–12–52; five learners (women's dresses).

Lonnie Frocks, 14 Luzerne Avenue, West Pittston, Pa., effective 10–1–51 to 4–1–52; 10 learners (dresses).

Madison Apparel Co., Inc., 296 Madison Street, Wilkes-Barre, Pa., effective 10–13–51 to 10–12–52; 10 percent of the productive factory force for normal labor turnover (women's dresses).

Nunnally & McCrea Co., Jasper, Ga., effective 9–24–51 to 3–23–52; an additional 25 learners may be employed for expansion purposes only (dungarees).

Palmer Shirt Co., 477 Lehigh Avenue, Palmerton, Pa., effective 9–28–51 to 9–27–52; 10 percent of the productive factory force for normal labor turnover (men's dress and sport shirts).

Plains Blouse Co., 10 Sarah Street, Plains, Pa., effective 10–6–51 to 10–5–52; for normal labor turnover, 10 percent of the productive factory workers or 10 learners, whichever is greater (blouses).

Port City Hosiery Mills, Inc., Wilmington, N. C., effective 10–6–51 to 10–5–52; for normal labor turnover, 10 percent of the productive factory force (ladies' woven underwear).

Providence Sportswear Manufacturing Co., 3 Green Ridge Street, Scranton, Pa., effective 10–1–51 to 9–30–52; 5 learners (ladies' dresses).

The Puritan Sportswear Corp., Outerwear Div., 813 Twenty-fifth Street, Altoona, Pa., effective 10–1–51 to 9–30–52; 10 percent of the productive factory force (outerwear jackets).

Rice-Stix Factory No. 25, Farmington, Mo., effective 10–6–51 to 10–5–52; 10 percent of the productive factory force for normal labor turnover (men's dress and sport shirts).

Sancar Corp., 28 West Rock Street, Harrisonburg, Va., effective 9–29–51 to 9–28–52; 10 percent of the productive factory force for normal labor turnover (ladies' underwear).

Souderton Dress Co., Front and Chestnut Streets, Souderton, Pa., effective 10–6–51 to 10–5–52; five learners (dresses).

Wentworth Manufacturing Co., 425 Pleasant Street, Fall River, Mass., effective 9–25–51 to 9–24–52; 10 percent of the productive factory force for normal labor turnover (ladies' cotton house dresses).

Hosiery Industry Learner Regulations (29 CFR 522.40 to 522.51, as revised January 25, 1950; 15 F. R. 283).

Empire Hosiery Finishers, Inc., 210 Northampton Avenue, Bethlehem, Pa., effective 9–27–51 to 9–26–52; five learners.

Hamilton Hosiery Finishers, Inc., Durham, N. C., effective 9–27–51 to 5–26–52; 20 additional learners.

Independent Telephone Industry Learner Regulations (29 CFR 522.82 to 522.93 as amended January 25, 1950; 15 F. R. 398).

Minnesota Telephone Co., Cannon Falls, Minn., effective 9–26–51 to 9–25–52.

Minnesota Telephone Co., Wheaton, Minn., effective 9–26–51 to 9–25–52.

Minnesota Telephone Co., Blooming Prairie, Minn., effective 9–26–51 to 9–25–52.

Glove Industry Learner Regulations (29 CFR 522.220 to 522.231, as amended October 26, 1950; 15 F. R. 6888).

Knoxville Glove Co., Knoxville, Tenn., effective 9–28–51 to 9–27–52; 10 percent of the productive factory force.

Wells Lamont Corp., Edina, Mo., effective 10–1–51 to 3–31–52; 10 learners for expansion purposes (supplemental certificate).

Knitted Wear Industry Learner Regulations (29 CFR 522.69 to 522.79, as amended January 25, 1950; 15 F. R. 398).

Fountain Hill Underwear Mills, Bethlehem, Pa., effective 9–25–51 to 9–24–52; 5 percent of the productive factory force.

Regulations Applicable to the Employment of Learners (29 CFR 522.1 to 522.14).

Glen L. Evans, Inc., 306 Paynter Avenue, Caldwell, Idaho, effective 10–1–51 to 3–30–52; 10 learners; Fly Tiers, 320 hours; 65 cents per hour for the first 160 hours and 70 cents per hour for the remaining 160 hours (fishing tackle).

Melster Candies, Inc., Madison Street, Cambridge, Wis., effective 10–1–51 to 3–31–52; three learners; Machine Operators, 120 hours; 65 cents per hour for the first 40 hours and 70 cents per hour for the remaining 80 hours (candy bars).

The following special learner certificate was issued in Puerto Rico to the company hereinafter named. The effective and expiration dates, the number of learners, the learner occupations, the length of the learning periods and the learner wage rates are indicated, respectively.

Semtex Knitting Mills, Inc., Gurabo, P. R., effective 9–21–51 to 3–20–52; 30 learners; knitters, 320 hours at 24 cents per hour, 320 hours at 27 cents per hour, 320 hours at 30 cents per hour; toppers, 320 hours at 24 cents per hour, 320 hours at 27 cents per hour, 320 hours at 30 cents per hour; loopers, 320 hours at 24 cents per hour, 320 hours at 27 cents per hour, 320 hours at 30 cents per hour; Sewing Union Sp., sewing ribbons, sewing by hand, washer, presser, buttonhole maker, button sewing, each 200 hours at 27 cents an hour, with the exception of sewing by hand which is 200 hours at 23 cents per hour (ladies' sweaters).

Each certificate has been issued upon the employer's representation that employment of learners at subminimum rates is necessary in order to prevent curtailment of opportunities for employment, and that experienced workers for the learner occupations are not available. The certificates may be cancelled in the manner provided in the regulations and as indicated in the certificates. Any person aggrieved by the issuance of any of these certificates may seek a review or reconsideration thereof within fifteen days after publication of this notice in the FEDERAL REGISTER pursuant to the provisions of Part 522.

Signed at Washington, D. C., this 5th day of October 1951.

MILTON BROOKE,
Authorized Representative of the Administrator.

[F. R. Doc. 51-12247; Filed, Oct. 11, 1951; 8:45 a. m.]

CIVIL AERONAUTICS BOARD

[Docket No. 3589, et al.]

REOPENED NORTH ATLANTIC ROUTE TRANSFER CASE

NOTICE OF ORAL ARGUMENT

Notice is hereby given, pursuant to the provisions of the Civil Aeronautics Act of 1938, as amended, that oral argument in the Reopened North Atlantic Route Transfer Case (seniority problems) is assigned to be held on October 16, 1951, at 10:00 a. m., e. s. t., in Room 5042, Com-

merce Building, 14th Street and Constitution Avenue NW., Washington, D. C., before the Board.

Dated at Washington, D. C. October 9, 1951.

By the Civil Aeronautics Board.

[SEAL] M. C. MULLIGAN, *Secretary.*

[F. R. Doc. 51-12282; Filed, Oct. 11, 1951; 8:49 a. m.]

[Docket No. 4924 et al.]

FLYING TIGER LINE, INC., AND RESORT AIRLINES, INC.

NOTICE OF HEARING

The matter of charter rules, regulations, rates and charges for the air transportation of persons and baggage proposed by the Flying Tiger Line, Inc., pursuant to its official passenger charter tariff No. 2, C. A. B. No. 23.

Notice is hereby given pursuant to the Civil Aeronautics Act of 1938, as amended, particularly sections 205 (a), 401 (a), 401 (f), and 1002 (a) (g) of said act, that a hearing in the above-entitled proceeding is assigned to be held on October 19, 1951, at 10:00 a. m., e. s. t., in Room E-210, Temporary Building No. 5, 16th Street and Constitution Avenue NW., Washington, D. C., before Examiner Curtis C. Henderson.

Without limiting the scope of the issues presented by the tariffs, particular attention will be directed to the following matters and questions:

I

1. Is the Flying Tiger Line, Inc., Official Passenger Charter Tariff No. 2, C. A. B. No. 23, and the rules, regulations, and rates and charges contained therein unlawful?

(a) Does the Flying Tiger Line, Inc., possess legal authority under section 401 of the act and Part 207 of the Economic Regulations to conduct "charter trips" carrying persons and their baggage in air transportation pursuant to section 401 (f) of the act and Part 207 of the Board's Economic Regulations?

2. If the rules, regulations, rates and charges applicable to charter trip service for persons and their baggage as set forth in The Flying Tiger Line, Inc., Official Passenger Charter Tariff No. 2, C. A. B. No. 23, are unlawful because Flying Tiger does not hold legal authority to engage in air transportation of persons and their baggage under section 401 of the act and the Economic Regulations should not such tariff be rejected in accordance with section 403 (a) of the act?

3. If the Flying Tiger Line, Inc., possesses legal authority under section 401 (f) of the act and Part 207 of the Board's Economic Regulations, thereunder to engage in air transportation of persons and their baggage in "charter trip" operations should the complaints of Eastern Air Lines, Inc., and Trans World Airlines, Inc., and the request of American Airlines, Inc., and United Air Lines, Inc., in Docket Nos. 4924 and 4927 be dismissed?

4. If the Flying Tiger Line, Inc., possesses legal authority under section 401 (f) of the act, and Part 207 of the Board's Economic Regulations, thereunder to engage in air transportation of persons and their baggage in "charter trip" operations, does this authority extend to "overseas" and "foreign" air transportation within the meaning of those terms as used in the act?

II

1. Is Resort Airlines, Inc., Special Services Tariff No. 1, C. A. B. No. 9, and any revisions and reissues thereof, and the fare, charges, rules and regulations set forth therein unlawful?

(a) Are the services which are set forth in the aforementioned tariff and any revisions and reissues thereof "special service(s)" within the meaning of section 401 (f) of the act and Part 207 of the Board's Economic Regulations?

(b) Is the aforementioned tariff and any revisions and reissues thereof unlawful, by reason of the fact that Resort Airlines, Inc., does not possess legal authority to operate such "special service(s)" except in accordance with the provisions of Resort Airlines' certificate of public convenience and necessity which authorizes Resort Airlines to furnish air transportation only as part of an all-expense escorted tour?

2. Is the Resort Airlines, Inc., Charter Tariff No. 3, C. A. B. No. 11, and any revisions and reissues thereof, and the rates, charges, rules, and regulations therein unlawful?

(a) Does Resort Airlines, Inc., possess legal authority within the meaning of section 401 (f) of the act and Part 207 of the Board's Economic Regulations to conduct the "charter trip(s)" service indicated in the aforementioned charter tariff and any revisions and issues thereof, except in accordance with the provisions of Resort Airlines' certificate of public convenience and necessity which authorizes Resort Airlines to furnish air transportation only as part of an all-expense escorted tour?

(b) If Resort Airlines, Inc., does possess legal authority within the meaning of section 401 (f) of the act and Part 207 of the Board's Economic Regulations to operate "charter trip(s)" within the meaning of that term as used in the act and the Economic Regulations without regard to the provisions of Resort Airlines' certificate of public convenience and necessity which authorizes Resort Airlines to furnish air transportation only as part of an all-expense escorted tour, does this authority extend to "interstate air transportation" within the meaning of this term as used in the act?

Notice is further given that any person desiring to be heard in opposition to the tariffs, other than parties of record, must file with the Board on or before October 19, 1951, a statement setting forth the issues of fact or law which he desires to controvert and such persons may appear and participate in the hearing in accordance with section 285.6 (a) of the rules of practice under Title IV of the Civil Aeronautics Act of 1938, as amended.

For further details of the service proposed and the relief requested interested parties are referred to the tariffs on file with the Civil Aeronautics Board.

Dated at Washington, D. C., October 9, 1951.

By the Civil Aeronautics Board.

[SEAL] M. C. MULLIGAN, *Secretary.*

[F. R. Doc. 51-12283; Filed, Oct. 11, 1951; 8:50 a. m.]

DEFENSE PRODUCTION ADMINISTRATION

[D. P. A. Request 18]

REQUEST TO PARTICIPATE IN THE FORMATION AND ACTIVITIES OF AN ARMY ORDNANCE INTEGRATION COMMITTEE ON M34 MODIFICATION KIT

Pursuant to section 708 of the Defense Production Act of 1950, as amended, the request set forth below to participate in the formation and activities of an Army Ordnance Integration Committee on M34 Modification Kit in accordance with the revised Voluntary Plan, entitled "Plan and Regulations of Ordnance Corps Governing the Integration Committee on M34 Modification Kit," dated August 1, 1951, was approved by the Attorney General after consultations with respect thereto between the Attorney General, the Chairman of the Federal Trade Commission and the Administrator of the Defense Production Administration and was transmitted to the companies listed below.

The revised Voluntary Plan, also set forth below, has been approved by the Administrator of the Defense Production Administration and found by him to be in the public interest as contributing to the national defense.

CONTENTS OF REQUEST

You are requested to participate in the formation and activities of the M34 Modification Kit Integration Committee in accordance with the revised Voluntary Plan, entitled "Plan and Regulations of Ordnance Corps Governing the Integration Committee on M34 Modification Kit," dated August 1, 1951, a copy of which is herewith enclosed.

In my opinion, your participation in the activities of this Committee will greatly assist in the accomplishment of our national defense program.

The Attorney General has approved this request after consultations with respect thereto between his representatives, representatives of the Chairman of the Federal Trade Commission and my representatives, pursuant to section 708 of the Defense Production Act of 1950, as amended.

I approve the revised Voluntary Plan and find it to be in the public interest as contributing to the national defense. You will become a participant therein upon notifying me in writing of your acceptance of this request. Immunity from prosecution under the Federal antitrust laws and the Federal Trade Commission Act will be given only upon such acceptance, provided that the activities of the M34 Modification Kit Integration Committee and your participation therein are within the limits set forth in the revised Voluntary Plan.

In the event that you accept this request will you kindly send a copy of your acceptance to the Procurement Division, Produc-

tion Branch, Office of the Assistant Chief of Staff, G–4, United States Army, Pentagon Building, Washington 25, D.C.

Your cooperation in this matter will be appreciated.

Sincerely,

MANLY FLEISCHMANN,
Administrator.

List of companies accepting request to participate

Lynch Brothers, Inc., Pine Meadow, Conn.

Doehler Metal Furniture Co., 192 Lexington Avenue, New York 16, N. Y.

Reynolds Metals Co., 2000 South Ninth Street, Louisville, Ky.

Engineering & Research Corp., Riverdale, Md.

Eisen Bros., Inc., 1601–1635 Willow Avenue, Hoboken, N. J.

Poloron Products, Inc., 55 Avenue E, New Rochelle, N. Y.

PLAN AND REGULATIONS OF ORDNANCE CORPS GOVERNING THE INTEGRATION COMMITTEE ON M34 MODIFICATION KIT

AUGUST 1, 1951

This describes the plan of the Ordnance Corps for the formation, organization and functioning of an Ordnance Integration Committee on M34 Modification Kit, and the operating procedure by which such Committee fulfills its purpose. It further presents an explanation of the necessity for, and urgent need for such a committee.

1. *Need for integration*—a. *General.*—There exists, with respect to the production of M34 Modification Kits, a need on the part of the Ordnance Corps for the integration of the production efforts of the contractors manufacturing such items. There are presently under contract with the Ordnance Corps for the production of these end items six manufacturers whose names and addresses are listed in paragraph a (5), section 6 hereof.

The M34 Modification Kit is procured in order to provide flush mount fins and lug bands for the Navy 5-inch High Velocity Aircraft Rocket (5-inch HVAR) so that this rocket can be fired from jet fighter planes equipped with retractable post launchers. Each Kit consists of the following:

(1) One Fin Assembly, Rocket M122. This is the item whose production presents certain difficulties that could be greatly alleviated by the Integration Committee. The fin assembly is made of sheet aluminum stampings assembled by spot and seam welding. The fin assembly connects into the rear post launchers and supports the end of the rocket.

(2) One Lug Band Assembly, Rocket M9, which is clamped around the central portion of the rocket motor and engages the forward launching post on the airplane wing.

(3) One Igniter Plug Assembly, Rocket M3, with two connectors attached. This assembly is used for connecting the rocket into the electrical system by which the airplane pilot can fire the rockets by remote control.

After the rockets are fired, the post launchers are retracted into the airplane wing so as to eliminate any unnecessary obstruction to the air flow past the wing. The M34 Kit permits the jet fighter planes to carry a large load of 5-inch HVAR rockets. The mounting arrangement of rockets is such that they can be carried in clusters beneath each launcher post. This greatly increases the fire power of the jet fighters and has been an important factor in the destruction by air action of enemy material in Korea. In the event of enemy attack where the jet fighter plane needs its maximum speed the entire load of rockets can be jettisoned by the pilot.

The M34 Modification Kit was developed by the Ordnance Corps at the request, and with the cooperation, of the Air Force. It is now procured by the Ordnance Corps and supplied to the Air Force. The requirements for this item and the funds for its procurement are supplied by the Air Force. The M34 Modification Kit is now a critical item of production with large requirements for Air Force use overseas and for training purposes.

As previously stated, the major item in the M34 Modification Kit which presents the existing procurement difficulty is the M122 Fin Assembly. The fins are fabricated from aluminum sheets with spot welded and seam welded joints. The severe service operating conditions, imposed by the combat use of the fins, require that these welded joints be made under very close inspection and production control procedure, in order to insure a safe end product. The high speed of the jet fighter planes imposes severe stresses on the fin construction. Spot and seam welding machines must be approved by government certification to conform with the requirements of the applicable specifications. Such certification requires considerable time, effort and expense. Certified spot and seam welding equipment is also being used extensively by the Aircraft Industry in their expanding procurement program. The demand for such equipment with trained operators is and will be severe in the present program of procurement by the services.

The M34 Modification Kit is currently being procured almost entirely from small business. The item is well adapted to manufacture by small business provided the facility has the necessary certified spot and seam welding equipment and trained operators. The requirements for this item exceed the capacity of any single producer. Also, for strategic reasons, such as dispersal of facilities, it is essential that many manufacturers make this critical ammunition item.

As with most ammunition items, the M34 Modification Kit manufacturers are making an item that has no commercial counterpart, and whose production requires the very strictest control to insure a safe end product. In addition, continuous changes and improvements are constantly being made to meet the requirements of the using services. These changes which are beyond the control of the manufacturers add to the difficulty of producing this item. It is extremely important that large quantities of this type of ammunition be manufactured and held in reserve stocks in the event large scale warfare breaks out, involving the extensive use of air power.

b. *Production and procurement problems.* The critical component in the M34 Modification Kit, i. e., the M122 fin assembly, is currently being made from aluminum sheets with spot and seam welded joints. Welding of aluminum to meet the severe service requirements is a difficult art and close production control is needed. The knowledge and experience on this class of work is only obtained by extensive trial and experiment. A vital function of the Integration Committee would be to make the "know-how" of successful producers available to new facilities, thereby reducing production lead time by at least 6 months. Integration action properly coordinated through the committee among the various producers of this item would conserve vitally needed welding equipment. Similar jobs could be pooled among the various producers. Lack of exchange of "know-how" among the producers has been a serious handicap in getting new facilities into production. Each new producer goes through the same weary headache of learning the hard way. The entire production program on the M34 Modification Kit is seriously behind schedule, and one major factor has been the lack of committee action and pooling of "know-how". Another vital function of the committee will be to expedite the procurement of sheet aluminum and arrange for exchange of material between the several producers. Lack of exchange of material has been a serious handicap to production. With the expanding airplane procurement program the demand for aluminum sheets will be, and is, becoming increasingly severe. There is a dire need for integrated action to forestall and prevent shutdown of producers due to shortages of material.

Procurement problems are multiplied because of the fact that none of the several items incorporated into the final assembly of the M34 Modification Kit is a commercial item. The item is of a special military design for a special military purpose and is subject to continuous engineering changes as field and training experience dictates. There is a dire need for expediting the dissemination of information concerning these changes. As an example, the major assemblies which presently require the greatest amount of attention are:

(1) Fin Assembly, Rocket M122 (Aluminum sheets fabricated with spot and seam welded joints).

(2) Lug Band, Rocket M9 (Alloy Steel).

(3) Igniter Plug, Rocket M3 (Copper wiring and single prong bayonet type connector plug).

All of the above are special military types and have no commercial counterpart.

c. *Scarcities.* There now exists a scarcity of basic materials such as aluminum sheets, alloy steel, brass, copper and the many small items needed to make specific components. Welding machines are in very critical supply, also machine tools. These scarcities of basic materials and tools produce a constantly recurring need for coordination and interchange among members of the committee.

2. *Reason for the selection of the Committee.* a. After World War II and prior to the Korean conflict, the Ordnance Corps conducted Industrial Mobilization Planning Programs with industry for the purpose of allocating facilities for making specific items, in the event of an emergency. Potential producers were selected under this plan. Certain criteria were established for the selection of these producers which included such requirements as management, engineering "know-how", facilities, and capabilities. Due consideration was also given to dispersion and strategic location. Concurrently with this effort Industry Preparedness Measures were also initiated within the funds permitted at that time. The objective of these measures was the development of mass production techniques for specific items. At the onset of the Korean conflict, and prior to the completion of the Industry Preparedness Measures, the poor supply position of the M34 Modification Kits item, and the extreme need for it, dictated the necessity for placing with industry immediate orders for mass production. These orders for large scale production were negotiated with limited competition due to the urgency of the requirement for the item. Previous production orders had been placed on the basis of open advertised bids.

b. Membership on the Committee shall be limited to those contractors actually under contract for the production of M34 Modification Kits, and committee activity shall be restricted to the problems relating to the production of such items. This limitation is necessary in order that the committee will not become involved in problems extraneous to the purpose for which it is organized. As other contractors are brought into the production program, they will become members in accordance with section 6a (5) hereof.

3. *Function of committee.* The committee is composed of all those manufacturers who are under contract with the Ordnance Corps to produce M34 Modification Kits. The committee functions within the scope of Section 5 hereof, and such function is limited to the

particular problems which arise as to the production of M34 Modification Kits. The Ordnance Corps, independently, evaluates the information available from Committee Activity and makes any determination of appropriate action to be taken. Through strict control of its Integration Committee activities it will prohibit any unauthorized and unwarranted use of the committee and will restrict the activities of the committee to the objectives set forth herein.

The Committee shall in no way be concerned with procurement policy and shall in no way affect or influence Ordnance Corps in the placement contracts, or in the price, trade, marketing, or any other of the incidents of procurement. Procurement has been made and shall be made in accordance with the Armed Services Procurement Act and the regulations, directives, and policies of the Department of Defense and the Department of the Army implementing such Act.

4. *Utilization of Committee by the Ordnance Corps.* The Ordnance Corps, through the medium of Committee Activity, as delineated in section 5 hereof, will be able to accomplish the following objectives:

a. Make available to all the prime contractors the benefit of the production experience and techniques of each contractor member in the group without royalty or charge, and so to integrate the facilities of the group as to attain maximum production in the shortest possible time.

b. Control, divert and direct critical components to prime contractors who have the greatest demand for them. One or more components may be in great demand at a given time by one prime contractor and at the same time another contractor may have an inventory of such components in excess of its immediate demands, yet have its production retarded for lack of some other critical component not immediately required by others.

c. Introduce and effect changes in material and design with a view to standardization of material, and to effect uniformity in bills and material, drawings, specifications and descriptions of engineering changes so as to maintain full interchangeability of such for all Ordnance requirements and assure the interchangeability of parts.

d. Provide for the interchange of materials, skills, tools, training aids, machines, and other necessities of production.

e. By comparison of productive data to the requirements of the Ordinance Corps, establish production schedules to meet such requirements.

5. *Specific activities of the Committee—*

a. *Furnishing of data.* The contractor-members furnish the Chairman or Deputy Chairman with a list of facilities; the rate of production, actual or projected; an inventory of finished parts; and inventory of material on hand, on order, and promised delivery. The Ordnance officer attached to the committee compiles the production data. By comparing this data to the requirements of the Ordnance Corps, a production schedule can be made by the Ordnance Corps. On the basis of this comparison, the Ordnance Corps will be enabled to determine whether the production capacity, material, and facilities requirements for present and future commitments are met.

b. *Allotment of production schedules.* After correlation of the data by the Ordnance representative, the committee may recommend to the Ordnance Corps the allotment of definite production schedules necessary to meet requirements.

c. *Changes in material and design including standardization of material.* The committee may consider and recommend desired changes in material and design including standardization of material. The Branch of the Ordnance Corps having control of the item or items is charged with the maintaining, through its engineering personnel, of bills of material, drawings and specifications, descriptions of engineering changes, etc. Where a committee member desires a change in one of the above engineering activities, the Ordnance Corps may decide that the change will be adopted by all members in order that the committee maintain full interchangeability for the Ordnance requirements.

The committee may conduct tests, chemical, metallurgical or mechanical through usual industry or Ordnance channels to prove the adequacy of the change. The committee may then submit, through the Committee Ordnance Officer, the recommendation for the change, together with full information to the Ordnance engineering personnel, for approval or rejection. The Ordnance Officer attached to the committee is charged by the Ordnance Corps to see that all members keep their drawings, etc., exactly alike, and that full interchangeability is always maintained for all Ordnance requirements.

d. *Interchange of parts, material, skills, tools, training aids, machines, etc.* The Ordnance Officer attached to the Committee will maintain such production, performance and control records and material inventories as are necessary. Based on these records the committee will be in a position to advise the Ordnance Corps of the most economical method of adjusting production to meet requirements and loading schedules.

The committee may consider and recommend to the Ordnance Corps, through the Ordnance Officer attached to the Committee, the interchange of parts, material, skills, tools, training aids, machines, etc. The transfer of government-owned machines or tools or other government property shall be made on memorandum receipt and shall be cleared through the Ordnance District Office or the Contracting Officer, whoever is responsible under the contract as a representative of the Ordnance Corps. The Interchange between industry members of property owned by them may be on an outright sales basis or on an exchange basis.

e. *Action to achieve uniformity of parts, drawings, bills of material.* Uniformity of parts and drawings among the contractors manufacturing any given end item is prerequisite to the interchange of material between committee members. The attainment of such uniformity where it does not already exist among the members of an Integration Committee is therefore an important function of every committee.

6. *Membership and meeting of Committee.* This committee will be formed as follows:

a. *Membership.* (1) The Chairman is Colonel W. M. Tisdale, Deputy Chief of the Ammunition Branch, Industrial Division, Office, Chief of Ordnance. (This is the Branch responsible for the procurement and production of M34 Modification Kits.)

(2) The Deputy Chairman is Lt. Colonel G. W. Mulder, Ordnance Ammunition Center, Joliet, Ill.

(3) The Assistant to the Chairman is Mr. C. K. Hellriegel, Engineering and Research Corporation, Riverdale, Md.

(4) One or more Ordnance Officers experienced in military procedures, M34 Modification Kit production and engineering, shall be appointed by the Chairman, to work with the committee.

(5) Contractor-membership shall be as follows:

(a) Each prime contractor producing M34 Modification Kits under Ordnance contracts shall be a member of the committee. The present contractor members are:

Lynch Bros., Inc., Pine Meadow, Conn.
Engineering & Research Corporation, Riverdale, Md.
Doehler Metal Furniture Co., Pottsdown, Pa.
Eisen Bros., Inc., Hoboken, N. J.
Poloron Products, Inc., New Rochelle, N. Y.
Reynolds Metals Co., Louisville, Ky.

(b) Each new prime contractor under Ordnance Corps contract for the production of M34 Modification Kits shall become a member of the committee. The name and address of each such contractor shall be submitted, through channels, to the Administrator, Defense Production Administration.

(c) Termination or cancellation of a contract with the Ordnance Corps for the production of M34 Modification Kits shall terminate the membership of such contractor member and the Administrator, Defense Production Administration, shall be notified of such termination, for appropriate action.

(6) One policy level official and one senior production official from each of the prime contractors shall represent the members of the committee. Specially qualified technical personnel of the contractor-members may attend committee sessions as required to furnish technical assistance.

(7) The Secretary will be an Ordnance officer designated by the Chairman or Deputy Chairman.

(8) Qualified consultants may be appointed to the Committee by the Ordnance Corps acting through the Chairman.

(9) Government employees shall render the necessary clerical assistance to the committee.

b. *Meetings.* (1) The following requirements for the conduct of meetings shall be observed:

(a) The initiation and formulation of agenda shall be performed by the government.

(b) The meetings to be held shall be at the call of and under the chairmanship of government representatives.

(c) Full and complete minutes shall be kept.

(d) Determinations of action to be taken shall be made solely by government representatives.

(2) Committee meetings shall be called by the Chairman, Deputy Chairman, or the Ordnance officer attached to the committee. The agenda shall be prepared by the Chairman or Deputy Chairman. Invitations to attend will include a copy of the agenda of the meeting in order to facilitate proper representation at the meeting.

(3) The Chairman, Deputy Chairman, or Ordnance Officer attached to the committee shall preside at all meetings, which shall be held at offices assigned to or under the control of the Ordnance Corps. The Secretary of the Committee shall maintain and keep minutes of committee meetings.

7. *Suspension of committee action.* This committee shall not be continued beyond the expiration date of Title VII of the Defense Production Act of 1950, as amended or extended, or such earlier date as the Ordnance Corps may designate. If, prior to the expiration date of the act, the need for further active operation of the committee ceases, the Chairman shall notify each member of the committee, the Administrator, Defense Production Administration, the Attorney General of the United States and the Chairman of the Federal Trade Commission to that effect. The committee will cease to function upon such notice and will be officially terminated by appropriate action on the part of the Administrator, Defense Production Administration.

(Sec. 708, 64 Stat. 818, 50 U. S. C. App. Supp. 2158; E. O. 10200, Jan. 3, 1951, 16 F. R. 61)

Dated: October 8, 1951.

MANLY FLEISCHMANN,
Administrator.

[F. R. Doc. 51-12352; Filed, Oct. 11, 1951; 11:15 a. m.]

FEDERAL POWER COMMISSION

[Project No. 1927]

CALIFORNIA OREGON POWER CO.

NOTICE OF ORDER APPROVING REVISED DRAWINGS AS PART OF LICENSE

OCTOBER 8, 1951.

Notice is hereby given that, on October 5, 1951, the Federal Power Commission issued its order, entered October 2, 1951, approving revised Exhibit L–7 drawings as part of license in the above-entitled matter.

[SEAL] LEON M. FUQUAY,
Secretary.

[F. R. Doc. 51–12248; Filed, Oct. 11, 1951; 8:45 a. m.]

[Docket Nos. G–1542, G–1773]

CUMBERLAND AND ALLEGHENY GAS CO. AND MANUFACTURERS LIGHT AND HEAT CO.

ORDER DENYING REQUEST FOR SHORTENED PROCEDURE, CONSOLIDATING PROCEEDINGS FOR PURPOSE OF HEARING AND FIXING DATE OF HEARING

OCTOBER 5, 1951.

In the matters of Cumberland and Allegheny Gas Company, Docket No. G–1542; Cumberland and Allegheny Gas Company and The Manufacturers Light and Heat Company, Docket No. G–1773.

On December 4, 1950, Cumberland and Allegheny Gas Company (Cumberland), a West Virginia corporation with its principal place of business at Pittsburgh, Pennsylvania, filed an application, as supplemented on August 7, 1951, for a certificate of public convenience and necessity pursuant to section 7 of the Natural Gas Act, authorizing the construction and operation of certain natural-gas transmission pipe-line facilities, or in the alternative, for an order disclaiming jurisdiction over the proposed construction and operation, all as more fully described in said application and supplement thereto on file with the Commission and open to public inspection. Due notice of the filing of such application has been given, including publication in the FEDERAL REGISTER on December 20, 1950 (15 F. R. 9111).

On August 23, 1951, Cumberland and the Manufacturers Light and Heat Company (Manufacturers), a Pennsylvania corporation with its principal place of business at Pittsburgh, Pennsylvania, filed a joint application for certificates of public convenience and necessity pursuant to section 7 of the Natural Gas Act, authorizing the construction and operation of certain natural-gas transmission pipe-line facilities, all as more fully described in such application on file with the Commission and open to public inspection. Due notice of the filing of such application has been given, including publication in the FEDERAL REGISTER on September 11, 1951 (16 F. R. 9202).

Temporary authorization to construct and operate the facilities was granted to Cumberland in Docket No. G–1542 by the Commission on February 5, 1951.

The applicants have requested that their applications be heard under the shortened procedure provided by § 1.32 (b) of the Commission's rules of practice and procedure (18 CFR 1.32 (b)) for noncontested proceedings.

The Commission finds: (1) Good cause has not been shown for granting the Applicants' requests that their applications be heard under the shortened procedure as provided by the Commission's rules of practice and procedure, and said requests should be denied as hereinafter ordered.

(2) Good cause exists to consolidate the proceedings on the above applications for the purpose of hearing.

The Commission orders:

(A) The requests of the Applicants that their applications in Docket Nos. G–1542 and G–1773 be heard under the shortened procedure provided by § 1.32 (b) of the Commission's rules of practice and procedure (18 CFR 1.32 (b)) be and the same are hereby denied.

(B) The aforesaid proceedings in Docket Nos. G–1542 and G–1773 be and the same hereby are consolidated for purpose of hearing.

(C) Pursuant to the authority contained in and by virtue of the jurisdiction conferred upon the Federal Power Commission by sections 7 and 15 of the Natural Gas Act, as amended, and the Commission's rules of practice and procedure, a public hearing be held commencing on October 29, 1951, at 10:00 a. m., e. s. t., in the Hearing Room of the Federal Power Commission, 1800 Pennsylvania Avenue NW., Washington, D. C., concerning the matters involved and the issues presented by the aforesaid applications.

(D) Interested State commissions may participate as provided by §§ 1.8 and 1.37 (f) (18 CFR 1.8 and 1.37 (f)) of the Commission's rules of practice and procedure.

Date of issuance: October 8, 1951.

By the Commission.

[SEAL] LEON M. FUQUAY,
Secretary.

[F. R. Doc. 51–12249; Filed, Oct. 11, 1951; 8:45 a. m.]

[Docket No. G–1789]

CONSOLIDATED GAS UTILITIES CORP.

ORDER DENYING REQUEST FOR SHORTENED PROCEDURE, PERMITTING INTERVENTION AND FIXING DATE OF HEARING

OCTOBER 5, 1951.

On September 10, 1951, Consolidated Gas Utilities Corporation (Consolidated), a Delaware corporation having its principal place of business in the Braniff Building, Oklahoma City, Oklahoma, filed an application for a certificate of public convenience and necessity pursuant to section 7 (b) of the Natural Gas Act, authorizing the abandonment and removal of approximately 17½ miles of 6-inch gas transmission pipeline extending from a point of connection with Consolidated's 14-inch line near the Northeast corner of Section 23, Township 13 North, Range 19 West, Custer County, Oklahoma, thence in a southerly direction to a point in or near the Southwest corner of Section 11, Township 10 North, Range 19 West, Washita County, Oklahoma. Due notice of the filing of such application has been given, including publication in the FEDERAL REGISTER on September 19, 1951 (16 F. R. 9533).

On October 2, 1951, a petition to intervene in the above-docketed proceeding was filed by "the United States of America represented by the Chief of the Bureau of Yards and Docks of the Navy Department", stating that the aforementioned 6-inch pipeline was constructed pursuant to an agreement between Consolidated and the Navy Department in which the Navy advanced approximately one-half of the estimated construction cost and Consolidated the balance; that under the terms of the agreement Consolidated was to be reimbursed for its investment at the rate of 5¢ per Mcf of gas consumed by the Navy, after which the Navy was to be reimbursed at the same rate, and following which, the line was to become the property of Consolidated; that said agreement was terminated on June 1, 1946; and that the Navy Department has not been reimbursed for its investment in the said pipeline. The Navy Department further stated that in the present state of National Emergency it contemplates the reactivation of the Clinton Naval Air Base.

Consolidated has requested that this application be heard under the shortened procedure provided by § 1.32 (b) (18 CFR 1.32 (b)) of the Commission's rules of practice and procedure.

The Commission finds:

(1) Good cause has not been shown for granting Consolidated's request that its application be heard under the shortened procedure as provided by the Commission's rules of practice and procedure, and said request should be denied as hereinafter ordered.

(2) The participation of the above-named petitioner in this proceeding may be in the public interest.

(3) Good cause exists to set the proceeding on the above application for hearing at the time and place as hereinafter ordered:

The Commission orders:

(A) The request of Consolidated that its application in Docket No. G–1789 be heard under the shortened procedure provided by § 1.32 (b) of the Commission's rules of practice and procedure (18 CFR 1.32 (b)) is hereby denied.

(B) The above-named petitioner be and it is hereby permitted to become an intervener in this proceeding, subject to the rules and regulations of the Commission: *Provided, however,* That the participation of such intervener shall be limited to matters affecting asserted rights and interests specifically set forth in the petition for leave to intervene: *And provided further,* That the admission of such intervener shall not be construed as recognition by the Commission that it may be aggrieved because of any order or orders of the Commission entered in this proceeding.

(C) Pursuant to the authority contained in and by virtue of the jurisdiction conferred upon the Federal Power Commission by sections 7 and 15 of the Natural Gas Act, as amended, and the

Commission's rules of practice and procedure, a public hearing be held commencing on October 23, 1951, at 10:00 a. m., e. s. t., in the Hearing Room of the Federal Power Commission, 1800 Pennsylvania Avenue NW., Washington, D. C., concerning the matter involved and the issues presented by the aforesaid application.

(D) Interested State commissions may participate as provided by §§ 1.8 and 1.37 (f) (18 CFR 1.8 and 1.37 (f)) of the Commission's rules of practice and procedure.

Date of issuance: October 8, 1951.

By the Commission.

[SEAL] LEON M. FUQUAY, *Secretary.*

[F. R Doc. 51-12250; Filed, Oct. 11, 1951; 8:45 a. m.]

FEDERAL TRADE COMMISSION

[File No. 21-439]

PEARL, CULTURED PEARL, AND IMITATION PEARL INDUSTRY

NOTICE OF HEARING AND OF OPPORTUNITY TO PRESENT VIEWS, SUGGESTIONS, OR OBJECTIONS

In the matter of proposed trade practice rules for the Pearl, Cultured Pearl, and Imitation Pearl Industry.

Opportunity is hereby extended by the Federal Trade Commisssion to any and all persons, partnerships, corporations, associations, or other parties, including farm, labor, and consumer groups, affected by or having an interest in the proposed trade practice rules for the Pearl, Cultured Pearl, and Imitation Pearl Industry, to present to the Commission such pertinent information, suggestions, or objections as they may desire to submit, and to be heard in the premises. For this purpose copies of the proposed rules may be obtained upon request to the Commission. Such views, information, suggestions or objections may be submitted by letter, memorandum, brief, or other communication, to be filed with the Commission not later than November 15, 1951. Opportunity to be heard orally will be afforded at the hearing beginning at 10 a. m., November 15, 1951, in the Waldorf Astoria Hotel, New York City, to any person who desires to appear and be heard. After due consideration of all matters presented in writing or orally, the Commission will proceed to final action on the proposed rules.

The industry for which these rules are proposed is composed of all persons, firms, corporations and organizations engaged in the importation, manufacture, processing or marketing of all kinds and types of pearls, cultured pearls, and imitation pearls, whether loose, strung, mounted, or affixed to another product.

Issued: October 9, 1951.

By the Commission.

[SEAL] D. C. DANIEL, *Secretary.*

[F. R. Doc. 51-12264; Filed, Oct. 11, 1951; 8:47 a. m.]

INTERSTATE COMMERCE COMMISSION

[4th Sec. Application 26455]

FERTILIZER AMMONIATING SOLUTION FROM SOUTH POINT, OHIO TO POINTS IN SOUTHERN TERRITORY

APPLICATION FOR RELIEF

OCTOBER 9, 1951.

The Commission is in receipt of the above-entitled and numbered application for relief from the long-and-short-haul provision of section 4 (1) of the Interstate Commerce Act.

Filed by: R. E. Boyle, Jr., Agent, for carriers parties to Agent C. A. Spaninger's tariff I. C. C. No. 1221.

Commodities involved: Fertilizer ammoniating solution, in tank-car loads.

From: South Point, Ohio.

To: Points in southern territory.

Grounds for relief: Competition with rail carriers, circuity, and to apply over short tariff routes rates constructed on the basis of the short line distance formula.

Schedules filed containing proposed rates: C. A. Spaninger's tariff I. C. C. No. 1221, Supp. 1.

Any interested person desiring the Commission to hold a hearing upon such application shall request the Commission in writing so to do within 15 days from the date of this notice. As provided by the general rules of practice of the Commission, Rule 73, persons other than applicants should fairly disclose their interest, and the position they intend to take at the hearing with respect to the application. Otherwise the Commission, in its discretion, may proceed to investigate and determine the matters involved in such application without further or formal hearing. If because of an emergency a grant of temporary relief is found to be necessary before the expiration of the 15-day period, a hearing, upon a request filed within that period, may be held subsequently.

By the Commission, Division 2.

[SEAL] W. P. BARTEL, *Secretary.*

[F. R. Doc. 51-12256; Filed, Oct. 11, 1951; 8:46 a. m.]

[4th Sec. Application 26456]

FLAVORING SYRUP IN THE SOUTHWEST

APPLICATION FOR RELIEF

OCTOBER 9, 1951.

The Commission is in receipt of the above-entitled and numbered application for relief from the long-and-short-haul provision of section 4 (1) of the Interstate Commerce Act.

Filed by: D. Q. Marsh, Agent, for the Illinois Central Railroad Company, Missouri-Kansas-Texas Railroad Company, and other carriers.

Commodities involved: Flavoring syrup, less-than-carloads.

Between points in Oklahoma and Texas, and between points in Louisiana, also between points in Louisiana, on the one hand, and Mississippi River crossings, on the other.

Grounds for relief: Competition with motor carriers and to apply over short tariff routes rates constructed on the basis of the short line distance formula.

Schedules filed containing proposed rates; D. Q. Marsh's tariff I. C. C. No. 3977, Supp. No. 2.

Any interested person desiring the Commission to hold a hearing upon such application shall request the Commission in writing so to do within 15 days from the date of this notice. As provided by the general rules of practice of the Commission, Rule 73, persons other than applicants should fairly disclose their interest, and the position they intend to take at the hearing with respect to the application. Otherwise the Commission, in its discretion, may proceed to investigate and determine the matters involved in such application without further or formal hearing. If because of an emergency a grant of temporary relief is found to be necessary before the expiration of the 15-day period, a hearing, upon a request filed within that period, may be held subsequently.

By the Commission, Division 2.

[SEAL] W. P. BARTEL, *Secretary.*

[F. R. Doc. 51-12257; Filed, Oct. 11, 1951; 8:46 a. m.]

[4th Sec. Application 26457]

PHOSPHATE OF SODA AND OTHER COMMODITIES TO THE SOUTH

APPLICATION FOR RELIEF

OCTOBER 9, 1951.

The Commission is in receipt of the above-entitled and numbered application for relief from the long-and-short-haul provision of section 4 (1) of the Interstate Commerce Act.

Filed by: D. Q. Marsh, Agent, for the Chicago, Rock Island and Pacific Railroad Company and other carriers, pursuant to fourth-section order No. 16101.

Commodities involved: Di-sodium phosphate, tri-sodium phosphate or phosphate of sodium, carloads.

From: Chicago, Ill., and points taking same rates, Chester, Marcus Hook, and Morrisville, Pa., North Claymont, Del., Carteret and Grasselli, N. J., and Trenton, Mich.

To: Anniston, Birmingham, Fairfield, Mobile, and Montgomery, Ala., Baton Rouge and New Orleans, La., and Memphis, Tenn.

Grounds for relief: Circuitous routes and operation through higher-rated territory.

Any interested person desiring the Commission to hold a hearing upon such application shall request the Commission in writing so to do within 15 days from the date of this notice. As provided by the general rules of practice of the Commission, Rule 73, persons other than applicants should fairly disclose their interest, and the position they intend to take at the hearing with respect to the application. Otherwise, the Commission, in its discretion, may proceed to investigate and determine the matters

involved in such application without further or formal hearing. If because of an emergency a grant of temporary relief is found to be necessary before the expiration of the 15-day period, a hearing, upon a request filed within that period, may be held subsequently.

By the Commission, Division 2.

[SEAL] W. P. BARTEL, *Secretary.*

[F. R. Doc. 51-12258; Filed, Oct. 11, 1951; 8:46 a. m.]

[4th Sec. Application 26458]

SULPHURIC ACID FROM FRONT ROYAL, VA. TO KINGSPORT AND HOLSTON, TENN.

APPLICATION FOR RELIEF

OCTOBER 9, 1951.

The Commission is in receipt of the above-entitled and numbered application for relief from the long-and-short-haul provision of section 4 (1) of the Interstate Commerce Act.

Filed by: R. E. Boyle, Jr., Agent, for the Southern Railway Company, Carolina, Clinchfield and Ohio Railway, and Carolina, Clinchfield and Ohio Railway of South Carolina.

Commodities involved: Sulphuric acid, in tank-car loads.

From: Front Royal, Va.

To: Kingsport and Holston, Tenn.

Grounds for relief: Competition with rail carriers and circuitous routes.

Schedules filed containing proposed rates; C. A. Spaninger's tariff I. C. C. No. 1200, Supp. 29.

Any interested person desiring the Commission to hold a hearing upon such application shall request the Commission in writing so to do within 15 days from the date of this notice. As provided by the general rules of practice of the Commission, Rule 73, persons other than applicants should fairly disclose their interest, and the position they intend to take at the hearing with respect to the application. Otherwise the Commission, in its discretion, may proceed to investigate and determine the matters involved in such application without further or formal hearing. If because of an emergency a grant of temporary relief is found to be necessary before the expiration of the 15-day period, a hearing, upon a request filed within that period, may be held subsequently.

By the Commission, Division 2.

[SEAL] W. P. BARTEL, *Secretary.*

[F. R. Doc. 51-12259; Filed, Oct. 11, 1951; 8:46 a. m.]

[4th Sec. Application 26459]

KYANITE FROM CLOVER, S. C., TO POINTS IN OFFICIAL TERRITORY

APPLICATION FOR RELIEF

OCTOBER 9, 1951.

The Commission is in receipt of the above-entitled and numbered application for relief from the long-and-short-haul provision of section 4 (1) of the Interstate Commerce Act.

Filed by: R. E. Boyle, Jr., Agent, for carriers parties to Agent C. A. Spaninger's tariff I. C. C. No. 1188.

Commodities involved: Kyanite, carloads.

From: Clover, S. C.

To: Points in official territory.

Grounds for relief: Competition with rail carriers and circuitous routes.

Any interested person desiring the Commission to hold a hearing upon such application shall request the Commission in writing so to do within 15 days from the date of this notice. As provided by the general rules of practice of the Commission, Rule 73, persons other than applicants should fairly disclose their interest, and the position they intend to take at the hearing with respect to the application. Otherwise the Commission, in its discretion, may proceed to investigate and determine the matters involved in such application without further or formal hearing. If because of an emergency a grant of temporary relief is found to be necessary before the expiration of the 15-day period, a hearing, upon a request filed within that period, may be held subsequently.

By the Commission, Division 2.

[SEAL] W. P. BARTEL, *Secretary.*

[F. R. Doc. 51-12260; Filed, Oct. 11, 1951; 8:47 a. m.]

[4th Sec. Application 26460]

WASTE SALTS FROM COOSA PINES, ALA. TO HOUSTON, TEX.

APPLICATION FOR RELIEF

OCTOBER 9, 1951.

The Commission is in receipt of the above-entitled and numbered application for relief from the long-and-short-haul provision of section 4 (1) of the Interstate Commerce Act.

Filed by: D. Q. Marsh, Agent, for carriers parties to his tariff I. C. C. No. 3899.

Commodities involved: Salts, waste, neutral, carloads.

From: Coosa Pines, Ala.

To: Houston, Tex.

Grounds for relief: Competition with rail carriers and circuitous routes.

Schedules filed containing proposed rates: D. Q. Marsh's tariff I. C. C. No. 3899, Supp. 64.

Any interested person desiring the Commission to hold a hearing upon such application shall request the Commission in writing so to do within 15 days from the date of this notice. As provided by the general rules of practice of the Commission, Rule 73, persons other than applicants should fairly disclose their interest, and the position they intend to take at the hearing with respect to the application. Otherwise the Commission, in its discretion, may proceed to investigate and determine the matters involved in such application without further or formal hearing. If because of an emergency a grant of temporary relief is found to be necessary before the expiration of the 15-day period, a hearing, upon a request filed within that period, may be held subsequently.

By the Commission, Division 2.

[SEAL] W. P. BARTEL, *Secretary.*

[F. R. Doc. 51-12261; Filed, Oct. 11, 1951; 8:47 a. m.]

UNITED STATES TARIFF COMMISSION

[Investigation No. 4]

SPRING CLOTHESPINS

NOTICE OF HEARING

A public hearing will be held by the United States Tariff Commission in the Hearing Room, Tariff Commission Building, Eighth and E Streets NW., Washington, D. C., beginning at 10 a. m. on November 13, 1951, at which all parties interested will be given opportunity to be present, to produce evidence, and to be heard in the matter of the investigation with respect to Spring Clothespins instituted by the Commission on September 10, 1951 under section 7 of the Trade Agreements Extension Act of 1951 (16 F. R. 9451).

Request to appear: Parties desiring to appear at the public hearing should notify the Secretary of the Commission in writing at its office in Washington, D. C., in advance of the hearing.

I certify that the above public hearing was ordered by the Tariff Commission on the 8th day of October 1951.

[SEAL] DONN N. BENT, *Secretary.*

[F. R. Doc. 51-12279; Filed, Oct. 11, 1951; 8:48 a. m.]

ECONOMIC STABILIZATION AGENCY

Office of Price Stabilization

[Ceiling Price Regulation 7, Section 43, Appendix to Special Order 87]

A-1 MANUFACTURING CO.

CEILING PRICES AT RETAIL AND MANUFACTURER'S SELLING PRICE

The following appendix to Special Order 87 under section 43, Ceiling Price Regulation 7, effective June 26, 1951, issued to A-1 Manufacturing Company, 1049 South Los Angeles Street, Los Angeles 15, California, covering men's and boys' jackets, slacks and shorts having the brand name(s) "Suppledrape Marine Blue Denims" lists the manufacturer's selling prices and ceiling prices at retail established by the special order.

Appendix. The manufacturer's selling prices are subject to the following terms: 2 percent 10 days EOM f. o. b., Los Angeles.

Manufacturer's selling price (per dozen):	*Ceiling prices at retail (per unit)*
$22.56	$2.95
$29.40 through $29.64	3.95
$33.96	4.50
$37.80	4.95

MICHAEL V. DISALLE, *Direction of Price Stabilization.*

OCTOBER 5, 1951.

[F. R. Doc. 51-12165; Filed, Oct. 5, 1951; 11:42 a. m.]

[Ceiling Price Regulation 7, Section 43, Appendix to Special Order 190]

WAYNE KNITTING MILLS

CEILING PRICES AT RETAIL AND MANUFACTURER'S SELLING PRICE

The following appendix to Special Order 190 under section 43, Ceiling Price Regulation 7, effective July 25, 1951, issued to Wayne Knitting Mills, Fort Wayne 1, Indiana, covering women's hosiery having the brand name(s) "Belle-Sharmeer" lists the manufacturer's selling prices and ceiling prices at retail established by the special order.

Appendix. The manufacturer's selling prices are subject to the following terms: Net 10 E. O. M.

Manufacturer's selling price (per dozen):	*Ceiling prices at retail (per unit)*
$9.50–$9.75	$1.35
$11.65	1.65
$12.25	1.75
$12.80	1.85
$13.50–$14.20	1.95

MICHAEL V. DISALLE,
Director of Price Stabilization.

OCTOBER 5, 1951.

[F. R. Doc. 51–12166; Filed, Oct. 5, 1951; 11:42 a. m.]

[Ceiling Price Regulation 7, Section 43, Appendix to Special Order 204]

ECLIPSE SLEEP PRODUCTS, INC.

CEILING PRICES AT RETAIL AND MANUFACTURER'S SELLING PRICES

The following appendix to Special Order 204 under section 43, Ceiling Price Regulation 7, effective July 26, 1951, issued to Eclipse Sleep Products, Inc., Milford Street, Atlantic and Montauk Avenues, Brooklyn 8, New York, covering mattresses and box springs having the brand name(s) "Quiltress," "Super Quiltress," "Superest," and "Royal Superest," lists the manufacturer's selling prices and ceiling prices at retail established by the special order.

Appendix. The manufacturer's selling prices are subject to the following terms: 2/30.

Manufacturer's selling price (per unit):	*Ceiling prices at retail (per unit)*
$28.50 less $0.50 p. m	$49.50
$30.50–$31.75 less $1.00 p. m	59.50
$35.75–$36.75 less $1.00 p. m	69.50
$38.75–$40.75 less $2.00 p. m	79.50

MICHAEL V. DISALLE,
Director of Price Stabilization.

OCTOBER 5, 1951.

[F. R. Doc. 51–12167; Filed, Oct. 5, 1951; 11:42 a. m.]

[Ceiling Price Regulation 7, Section 43, Special Order 102, Amendment 1]

ROSE BROTHERS, INC.

CEILING PRICES AT RETAIL

Statement of considerations. Special Order 102, issued to Rose Brothers, Inc., under section 43 of Ceiling Price Regulation 7, established ceiling prices for sales at retail for the spring lines of men's suits and slacks having the brand name(s) "Surretwill", "Krisp-Spun", and "Airgora-Spun".

This amendment to Special Order 102 establishes ceiling prices for sales at retail for the fall line of men's suits and slacks having the brand name "Surretwill". The Director has determined that the retail ceiling prices requested for the fall lines are no higher than the level of ceiling prices under Ceiling Price Regulation 7.

Amendatory provisions. 1. Delete paragraph 1 from the special order and substitute therefor the following:

The following ceiling prices are established for sales after the effective date of this special order for any seller at retail of men's suits and slacks manufactured by Rose Brothers, Inc., 275 Seventh Avenue, New York 1, New York, having the brand name(s) "Surretwill", "Krisp-Spun", and "Airgora-Spun", and described in the manufacturer's application dated April 16, 1951, as supplemented and amended in the manufacturer's applications dated July 11, 1951, and September 13, 1951. The manufacturer's prices listed below are subject to terms of 2/10, Net 60.

SPRING LINE ("SURRETWILL", "KRISP-SPUN", "AIRGORA-SPUN")

Manufacturer's selling price (per unit):	*Ceiling prices at retail (per unit)*
$5.10	$8.50
$5.40	8.95
$9.50	15.95
$19.50	32.50
$21.00	35.00
$30.50	50.00

FALL LINE ("SURRETWILL")

$10.50	$17.00
$33.50	55.00

2. In paragraph 4 of the special order, delete the following:

The manufacturer shall annex to the special order a notice, listing the cost and discount terms to retailers for each article covered by this special order and the corresponding retail ceiling price fixed by this special order for an article of that cost. The notice shall be in substantially the following form:

(Column 1)	(Column 2)
Our price to retailers	Retailer's ceilings for articles of cost listed in column 1

$_____ per_____{unit. / dozen. / etc.} Terms {net. / percent EOM. / etc.}

$_____

Within 15 days after the effective date of this special order, two copies of this notice must also be filed by the manufacturer with the Distribution Price Branch, Consumer Soft Goods Division, Office of Price Stabilization, Washington 25, D. C.

Effective date. This amendment shall become effective on October 5, 1951.

MICHAEL V. DISALLE,
Director of Price Stabilization.

OCTOBER 5, 1951.

[F. R. Doc. 51–12168; Filed, Oct. 5, 1951; 11:43 a. m.]

[Ceiling Price Regulation 7, Section 43, Special Order 258, Amdt. 1]

WESTMORELAND GLASS CO.

CEILING PRICES AT RETAIL

Statement of considerations. The accompanying amendment to Special Order 258 under section 43 of Ceiling Price Regulation 7 modifies those provisions relating to preticketing usually required by orders of this type. This amendment, designed to meet the particular requirements of the glassware industry, accomplishes the objective of notifying consumers of the uniform prices fixed under the order. The preticketing method established by this amendment is necessary because the articles covered by the special order are characteristically not adaptable to the usual preticketing method.

Amendatory provisions. 1. Delete paragraph 3 of the special order and substitute therefor the following:

3. On and after December 6, 1951, Westmoreland Glass Company must furnish each purchaser for resale to whom within two months immediately prior to the effective date the manufacturer had delivered any article covered by paragraph 1 of this special order, with a sign 8 inches wide and 10 inches high, a price book, and a supply of tags and stickers. The sign must contain the following legend:

The retail ceiling prices for Westmoreland Glass Company glassware have been approved by OPS and are shown in a price book we have available for your inspection.

The price book must contain an accurate description of each article covered by paragraph 1 of this special order and the retail ceiling price fixed for each article. The front cover of the price book must contain the following legend:

The retail ceiling prices in this Westmoreland Glass Company price book have been approved by OPS under section 43, CPR 7.

The tags and stickers must be in the following form:

Westmoreland Glass Company
OPS—Sec. 43—CPR 7
Price $_____

Prior to January 4, 1952, unless the retailer has received the sign described above and has it displayed so that it may be easily seen and a copy of the price book described above available for immediate inspection, the retailer shall comply with the marking, tagging, and posting provisions of the revocation which would apply in the absence of this special order. On and after January 4, 1952, no retailer may offer or sell any article covered by this order unless he has the sign described above displayed so that it may be easily seen and a copy of the price book described above available for immediate inspection. In addition, the retailer must affix to each article covered by the order and which is offered for sale on open display (except in show windows or decorative displays) a tag or sticker described above. The tag or sticker must contain the retail ceiling price established by this special order for the article to which it is affixed.

Upon issuance of any amendment to this special order which either adds an article to those already listed in the manufacturer's application or changes the retail ceiling price of a listed article, the applicant named in this special order must within 30 days after the effective date of the amendment, as to each such article, send an insertion stating the required addition or change for the price book described above. After 60 days from the effective date of the amendment, no retailer may offer or sell the article, unless he has received the insertion described above and inserted it in the price book. Prior to the expiration of the 60 day period, unless the retailer has received and placed the insertion in the price book, the retailer shall comply with the marking, tagging, and posting provisions of the regulation which would apply in the absence of this special order.

Effective date. This amendment shall become effective on October 5, 1951.

MICHAEL V. DISALLE,
Director of Price Stabilization.

OCTOBER 5, 1951.

[F. R. Doc. 51-12169; Filed, Oct. 5, 1951; 11:43 a. m.]

[Ceiling Price Regulation 7, Section 43, Special Order 273, Amendment 1]

DOULTON AND CO., INC.

CEILING PRICES AT RETAIL

Statement of considerations. The accompanying amendment to Special Order 273 under section 43 of Ceiling Price Regulation 7 modifies those provisions relating to preticketing usually required by orders of this type. This amendment, designed to meet the particular requirements of the earthenware and chinaware industries, accomplishes the objective of notifying consumers of the uniform prices fixed under the order.

Amendatory provisions. Special Order 273 under Ceiling Price Regulation 7, section 43, is amended in the following respects:

1. In paragraph 1 delete the word "manufacturer's" and substiute therefor the word "wholesaler's".

2. Delete paragraph 3 of the special order and substitute therefor the following:

On and after November 6, 1951, Doulton and Co., Inc., must furnish each purchaser for resale to whom within two months immediately prior to the effective date the wholesaler had delivered any article covered by paragraph 1 of this special order, with a sign 8 inches wide and 10 inches high, a price book, and a supply of tags and stickers. The sign must contain the following legend:

The retail ceiling prices for Doulton and Co., Inc., imported china have been approved by OPS and are shown in a price book we have available for your inspection.

The price book must contain an accurate description of each article covered by paragraph 1 of this special order and the retail ceiling price fixed for each article. The front cover of the price book must contain the following legend:

The retail ceiling prices in this Doulton and Co., Inc., price book have been approved by OPS under section 43, CPR 7.

The tags and stickers must be in the following form:

Doulton and Co., Inc.
OPS—Sec. 43—CPR 7
Price $--------

On and after December 6, 1951, no retailer may offer or sell any article covered by this order unless he has the sign described above displayed so that it may be easily seen and a copy of the price book described above available for immediate inspection. Prior to December 6, 1951, unless the retailer has received the sign described above, and has it displayed so that it may be easily seen and a copy of the price book described above available for immediate inspection, the retailer shall comply with the marking, tagging, and posting provisions of the regulation which would apply in the absence of this special order. In addition, the retailer must affix to each article covered by the order and which is offered for sale on open display (except in show windows or decorative displays) a tag or sticker described above. The tag or sticker must contain the retail ceiling price established by this special order for the article to which it is affixed.

Upon issuance of any amendment to this special order which either adds an article to those already listed in the wholesaler's application or changes the retail ceiling price of a listed article, the applicant named in this special order must within 30 days after the effective date of the amendment, as to each such article, send an insertion stating the required addition or change for the price book described above. After 60 days from the effective date of the amendment, no retailer may offer or sell the article, unless he has received the insertion described above and inserted it in the price book. Prior to the expiration of the 60 day period, unless the retailer has received and placed the insertion in the price book, the retailer shall comply with the marking, tagging, and posting provisions of the regulation which would apply in the absence of this special order.

Effective date. This amendment shall become effective October 5, 1951.

MICHAEL V. DISALLE,
Director of Price Stabilization.

OCTOBER 5, 1951.

[F. R. Doc. 51-12170; Filed, Oct. 5, 1951; 11:43 a. m.]

[Ceiling Price Regulation 7, Section 43, Special Order 486, Amendment 1]

TAYLOR, SMITH & TAYLOR CO.

CEILING PRICES AT RETAIL

Statement of considerations. The accompanying amendment to Special Order 486 under section 43 of Ceiling Price Regulation 7 modifies those provisions relating to preticketing usually required by orders of this type. This amendment, designed to meet the particular requirements of the dinnerware industry, accomplishes the objective of notifying consumers of the uniform prices fixed under the order. The preticketing method established by this amendment is necessary because the articles covered by the special order are characteristically not adaptable to the usual preticketing method.

Amendatory provisions. 1. Delete paragraph 2 of the special order and substitute therefor the following:

2. On and after December 6, 1951, The Taylor, Smith & Taylor Co. must furnish each purchaser for resale to whom within two months immediately prior to the effective date the manufacturer had delivered any article covered by paragraph 1 of this special order, with a sign 8 inches wide and 10 inches high, a price book, and a supply of tags and stickers. The sign must contain the following legend:

The retail ceiling prices for The Taylor, Smith & Taylor Co. dinnerware have been approved by OPS and are shown in a price book we have available for your inspection.

The price book must contain an accurate description of each article covered by paragraph 11 of this special order and the retail ceiling price fixed for each article. The front cover of the price book must contain the following legend:

The retail ceiling prices in this Taylor, Smith & Taylor Co. price book have been approved by OPS under section 43, CPR 7.

The tags and stickers must be in the following form:

The Taylor, Smith, & Taylor Co.
OPS—Sec. 43—CPR 7
Price $--------

Prior to January 4, 1952, unless the retailer has received the sign described above and has it displayed so that it may be easily seen and a copy of the price book described above available for immediate inspection, the retailer shall comply with the marking, tagging, and posting provisions of the revocation which would apply in the absence of this special order. On and after January 4, 1952, no retailer may offer or sell any article covered by this order unless he has the sign described above displayed so that it may be easily seen and a copy of the price book described above available for immediate inspection. In addition, the retailer must affix to each article covered by the order and which is offered for sale on open display (except in show windows or decorative displays) a tag or sticker described above. The tag or sticker must contain the retail ceiling price established by this special order for the article to which it is affixed.

Upon issuance of any amendment to this special order which either adds an article to those already listed in the manufacturer's application or changes the retail ceiling price of a listed article, the applicant named in this special order must within 30 days after the effective date of the amendment, as to each such article, send an insertion stating the required addition or change for the price book described above. After 60 days from the effective date of the amend-

ment, no retailer may offer or sell the article, unless he has received the insertion described above and inserted it in the price book. Prior to the expiration of the 60 day period, unless the retailer has received and placed the insertion in the price book, the retailer shall comply with the marking, tagging, and posting provisions of the regulation which would apply in the absence of this special order.

Effective date. This amendment shall become effective on October 5, 1951.

MICHAEL V. DISALLE,
Director of Price Stabilization.

OCTOBER 5, 1951.

[F. R. Doc. 51-12171; Filed, Oct. 5, 1951; 11:43 a. m.]

[Delegation of Authority 23]

DIRECTOR OF REGION 6

DELEGATION OF AUTHORITY TO ESTABLISH GROUP ADJUSTMENT OF CERTAIN CONTRACT MOTOR CARRIER RATES

By virtue of the authority vested in me as Director of Price Stabilization pursuant to the Defense Production Act of 1950 (64 Stat. 812), as amended, Executive Order 10161 (15 F. R. 6105), and Economic Stabilization General Order No. 2 (16 F. R. 738), this delegation of authority is hereby issued.

1. *Authority to act under section 5 (d) of Supplementary Regulation 39 to the General Ceiling Price Regulation.* Authority is hereby delegated to the Director of Region 6 of the Office of Price Stabilization to establish or adjust, on a uniform group basis, the ceiling rates of all contract motor carriers engaged in the transportation of milk, fruit or vegetables in a local area in Region 6, provided individual applications are filed by a representative number of the carriers commonly engaged in handling that particular traffic, or by a user of such service.

The delegation of authority shall take effect on October 12, 1951.

MICHAEL V. DISALLE,
Director of Price Stabilization.

OCTOBER 11, 1951.

[F. R. Doc. 51-12357; Filed, Oct. 11, 1951; 11:32 a. m.]

DEPARTMENT OF JUSTICE

Office of Alien Property

AUTHORITY: 40 Stat. 411, 55 Stat. 839, Pub. Laws 322, 671, 79th Cong., 60 Stat. 50, 925; 50 U. S. C. and Supp. App. 1, 616; E. O. 9193, July 6, 1942, 3 CFR, Cum. Supp., E. O. 9567, June 8, 1945, 3 CFR, 1945 Supp., E. O. 9788, Oct. 14, 1946, 11 F. R. 11981.

RENE ALPHONSE DUFOUR AND HENRI AUGUSTE LEDUC

NOTICE OF INTENTION TO RETURN VESTED PROPERTY

Pursuant to section 32 (f) of the Trading With the Enemy Act, as amended, notice is hereby given of intention to return, on or after 30 days from the date of the publication hereof, the following property, subject to any increase or decrease resulting from the administration thereof prior to return, and after adequate provision for taxes and conservatory expenses:

Claimant, Claim No., Property, and Location

Rene Alphonse Dufour and Henri Auguste Leduc, Paris, France; Claim No. 35518; $53,530.80 cash in the Treasury of the United States.

Executed at Washington, D. C., on October 5, 1951.

For the Attorney General.

[SEAL] HAROLD I. BAYNTON,
Assistant Attorney General,
Director, Office of Alien Property.

[F. R. Doc. 51-12280; Filed, Oct. 11, 1951; 8:49 a. m.]